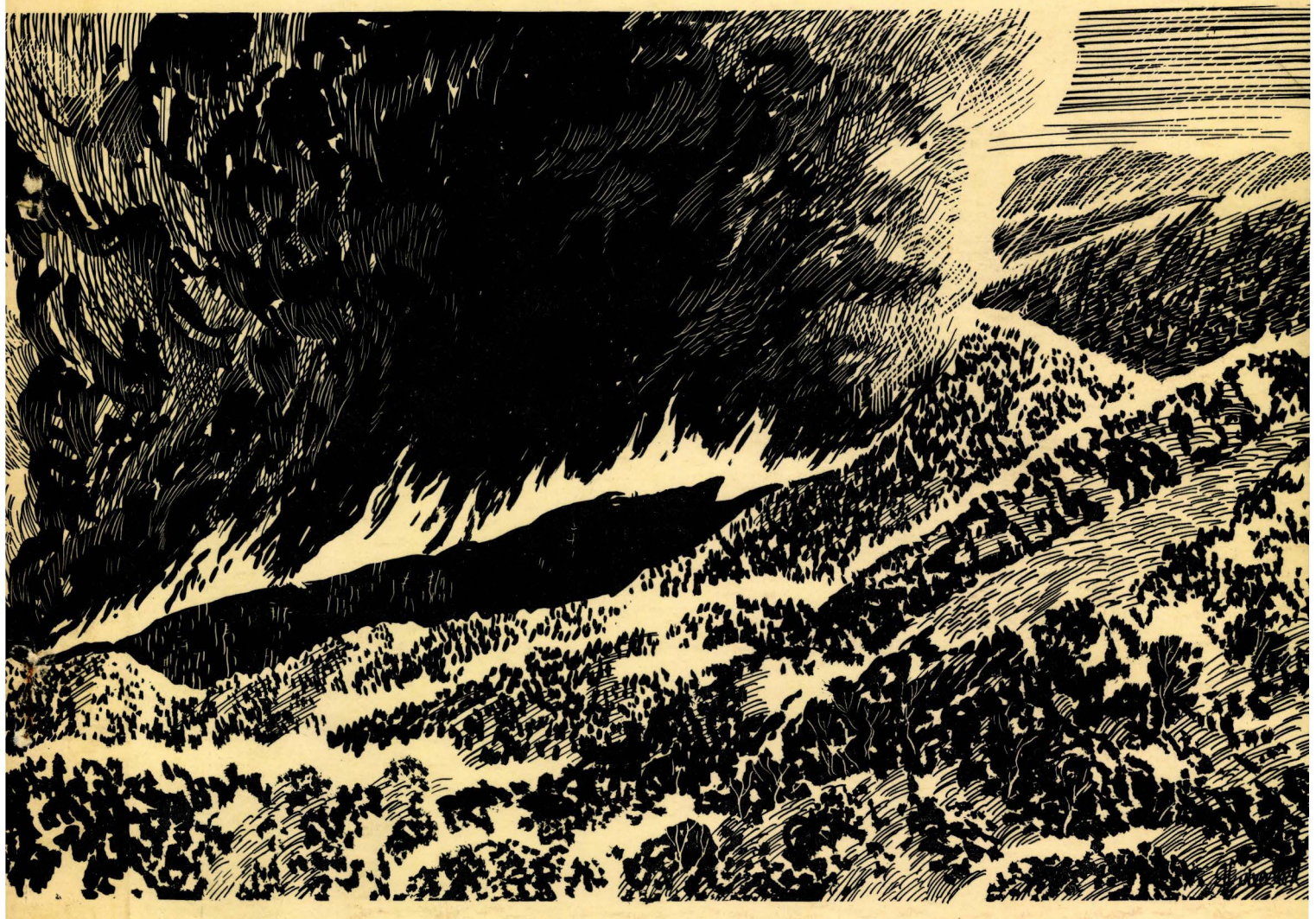
FIRE CONTROL CONFERENCE

OGDEN·UTAH · FEBRUARY 15-20·1954
WASHINGTON·D·C· APRIL 8-9·1954



U.S. DEPARTMENT OF AGRICULTURE · FOREST SERVICE

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PROCEEDINGS
OF THE
FIRE CONTROL CONFERENCE
OGDEN, UTAH, FEBRUARY 15-20, 1954
WASHINGTON, D. C., APRIL 8-9, 1954

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
WASHINGTON, D. C. JUNE 1954

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SUMMARY OF FACTS, CONCLUSIONS
AND
RECOMMENDATIONS

Early in 1952, at a meeting of Western technical fire control personnel, the suggestion was made that a meeting of regional foresters, directors and technical fire control personnel be called for the purpose of objectively discussing fire control management in all its phases.

The desirability of such a conference was affirmed but it was concluded that instead of a single conference two conferences would be held. This resulted in a conference during the week of February 15, 1954 at Ogden, Utah attended primarily by technical fire personnel excepting for one Regional Forester and three Station Directors who attended the Ogden conference full or part time.

The purpose of the first or technical meeting was to explore the present situation in fire control activities, study the analyses that were presented and through discussions develop recommendations for changes in present practices and policies to be presented at a later meeting to the Chief and his staff consisting of the Branch Chiefs, Regional Foresters and Directors.

The purpose of the second meeting was to consider these recommendations with the Chief and his staff and to discuss them in relation to overall Forest Service programs and policies with the objective of reaching as many firm conclusions as possible. This policy-action meeting convened April 8 and continued through April 9.

Following is a summary of analyses made, discussions, conclusions, recommendations and Washington office comments for each of the topics considered by the conferees attending the policy-action conference in Washington, D. C. April 8-9, 1954.

STOCK TAKING IN FIRE CONTROL MANAGEMENT

Where do we stand in the fundamentals of fire control management? Are we doing an acceptable job? Where are we headed?

A. Protection Results

1. Resource losses and their overall significance.

a. The Analysis.

Volume of timber killed by fire, area of timber lands crowned out, acres of young growth killed,

area of important watersheds impaired, total area burned over are shown by annual averages by periods since 1906 to provide a comparison of fire protection as of today with former years, also one measure of the adequacy of protection. This material is shown in chart form separately by regions and in summary form for all national forests.

b. Analysis Digest.

A picture of resource losses on the national forests of the United States is shown by a series of charts and graphs. The first 6 charts illustrates the various resource losses for national forest land as a whole -- for the entire United States. For the earlier years, beginning with 1906, resource losses are shown by varying periods. From 1906 to 1920, they are shown in 5 year periods; 1921 to 1927 is shown as a separate period; 1928 to 1932 is shown as the 5 year period prior to the CCC program. The CCC period (1933-1941) is shown separately. The more recent period from 1940 to 1952 has been plotted in 3 year running averages. This was done in order to better show the resource loss trend over a period of recent years.

Chart No. 1 illustrates the volume of timber killed by fire on national forest lands since the beginning of Forest Service protection. It will be noted there were tremendous losses of timber from fire in the early history of the Forest Service. The period of 1906-1910 showed an average annual loss of 1.4 billion board feet. Another period of high annual loss was between 1916 and 1920 when, on the average, slightly in excess of 1 billion board feet of timber was destroyed by fire.

Chart 1 illustrates that, as protection was strengthened, the loss in volume of timber was greatly reduced. A discouraging picture is the upward trend in loss of timber during the past few years. Large volume losses of commercial timber in any one year, in any one working circle, can have a serious effect upon the management plan for that working circle and the stability of the dependent community.

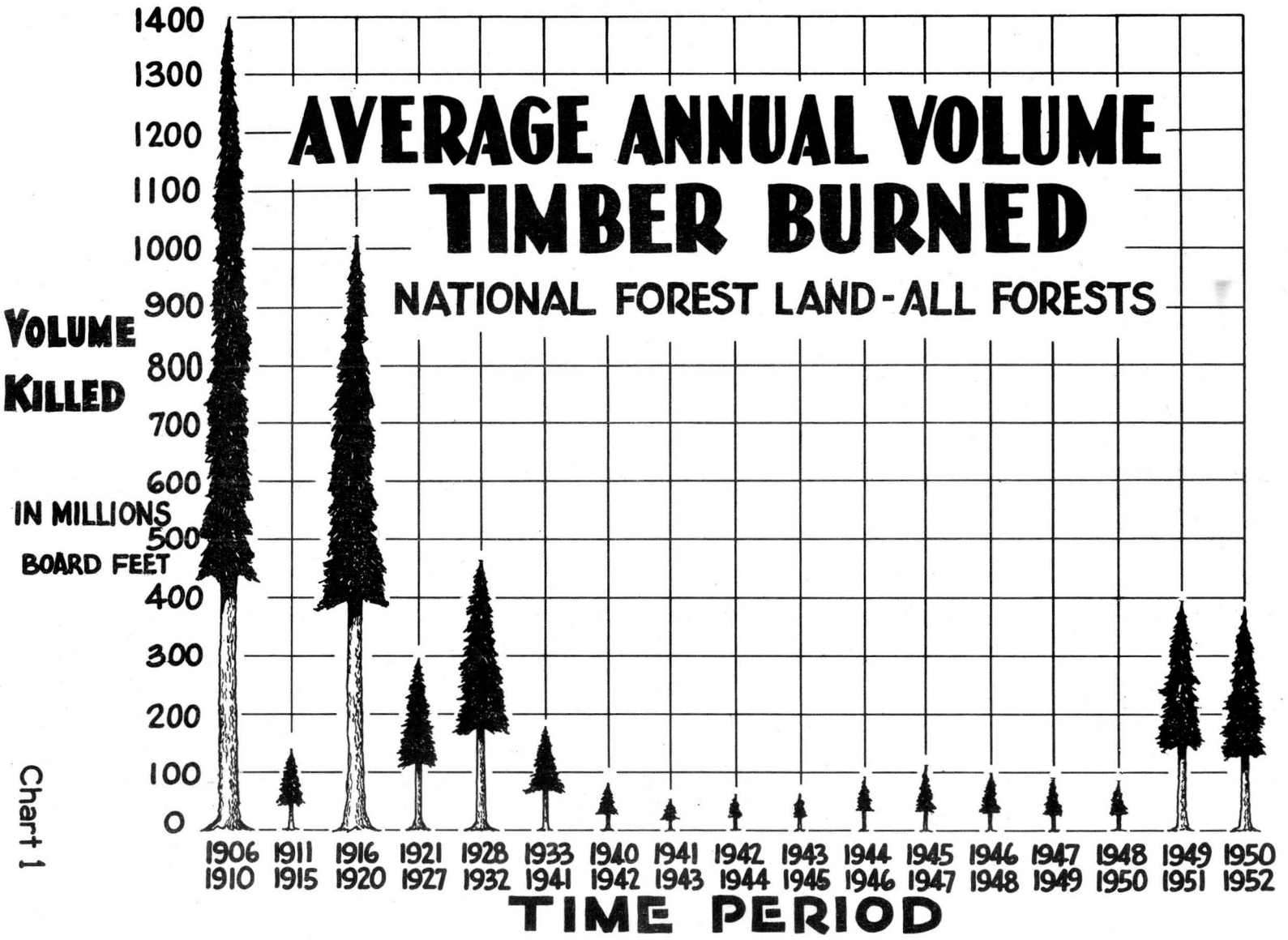
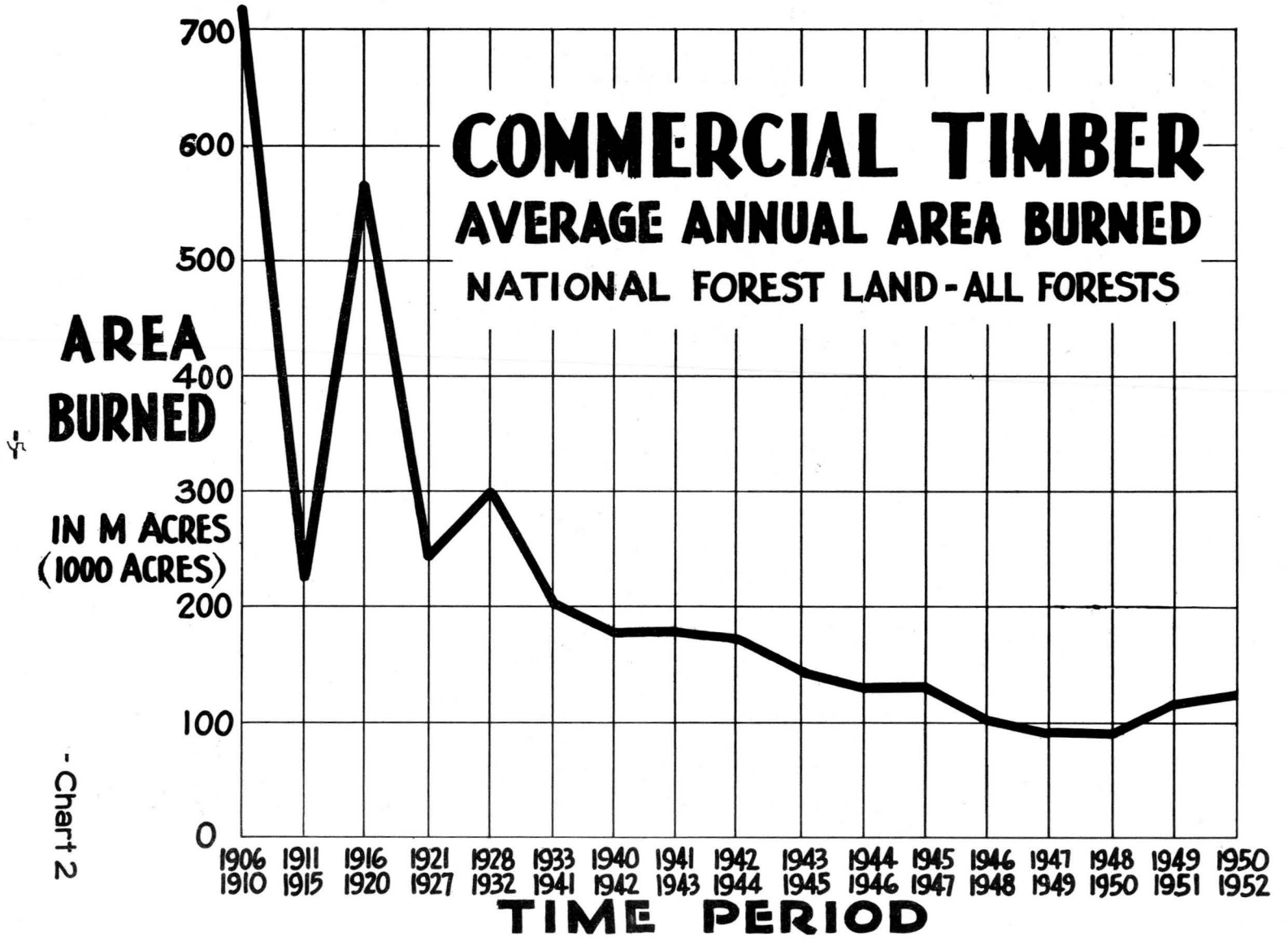

AVERAGE ANNUAL VOLUME
TIMBER BURNED
NATIONAL FOREST LAND - ALL FORESTS
VOLUME KILLED
IN MILLIONS
BOARD FEET
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

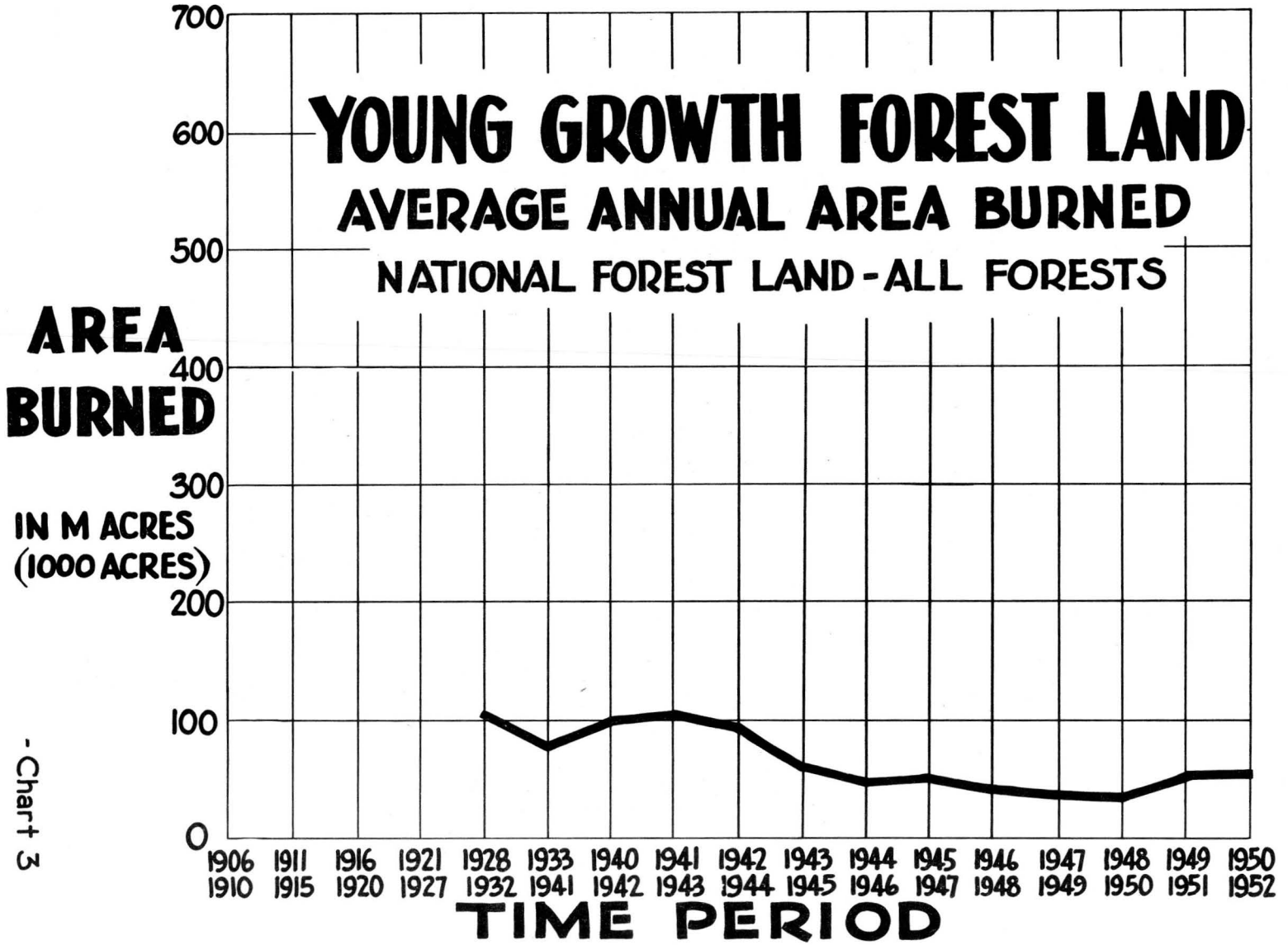
Chart 1

Chart 2 shows the average annual area of national forest commercial forest lands burned by periods. Here again an excellent overall downward trend since 1906 is noted. However, it is disturbing to note that the trend in commercial forest lands burned over has moved upward in recent years.


COMMERCIAL TIMBER
AVERAGE ANNUAL AREA BURNED
NATIONAL FOREST LAND - ALL FORESTS
AREA BURNED
IN M ACRES
(1000 ACRES)
700
600
500
400
300
200
100
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

- Chart 2

The chart on the next page shows the average annual burn of young-growth. This chart, for national forest lands only, is of considerable significance in that loss of young-growth can have a very serious impact upon the management of a working circle. In a managed forest, a high percentage of the allowable cut is based upon growth put on annually by young growth stands of timber. A fire which kills a young-growth stand of timber up to 40 or 60 years of age removes the area from increment production for many years - 100 years in some areas. Furthermore, most of these stands are at an age where their increment is very significant to the overall management plan. In an overall plan for protection of forest land, based upon their great importance in a managed forest, great consideration should be given to protection of stands of young-growth. Although the record over the years shows a very desirable trend in the loss of young-growth forests, it is again very disturbing to note that the trend is now upward rather than downward - which it should be if successful management is to be applied to our forests.


YOUNG GROWTH FOREST LAND
AVERAGE ANNUAL AREA BURNED
NATIONAL FOREST LAND - ALL FORESTS
AREA BURNED
IN M ACRES
(1000 ACRES)
700
600
500
400
300
200
100
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

- Chart 3

Chart 4 illustrates the average annual burn on non-commercial national forest lands --- primarily watershed lands. As in other resource losses, protection of national forest watershed lands has shown improvement over the years; but here again the trend in the last few years has taken a turn for the worse. This is at a time when the values of such watershed lands are increasing at a rapid rate. The importance of national forest land from a water producing standpoint has increased over the years the national forests have been in existence. With the trend of heavy population movement to the West, the importance of our national forest watersheds in western areas becomes greater. Because of this, the importance of protection from fire for watershed lands becomes greater and greater.

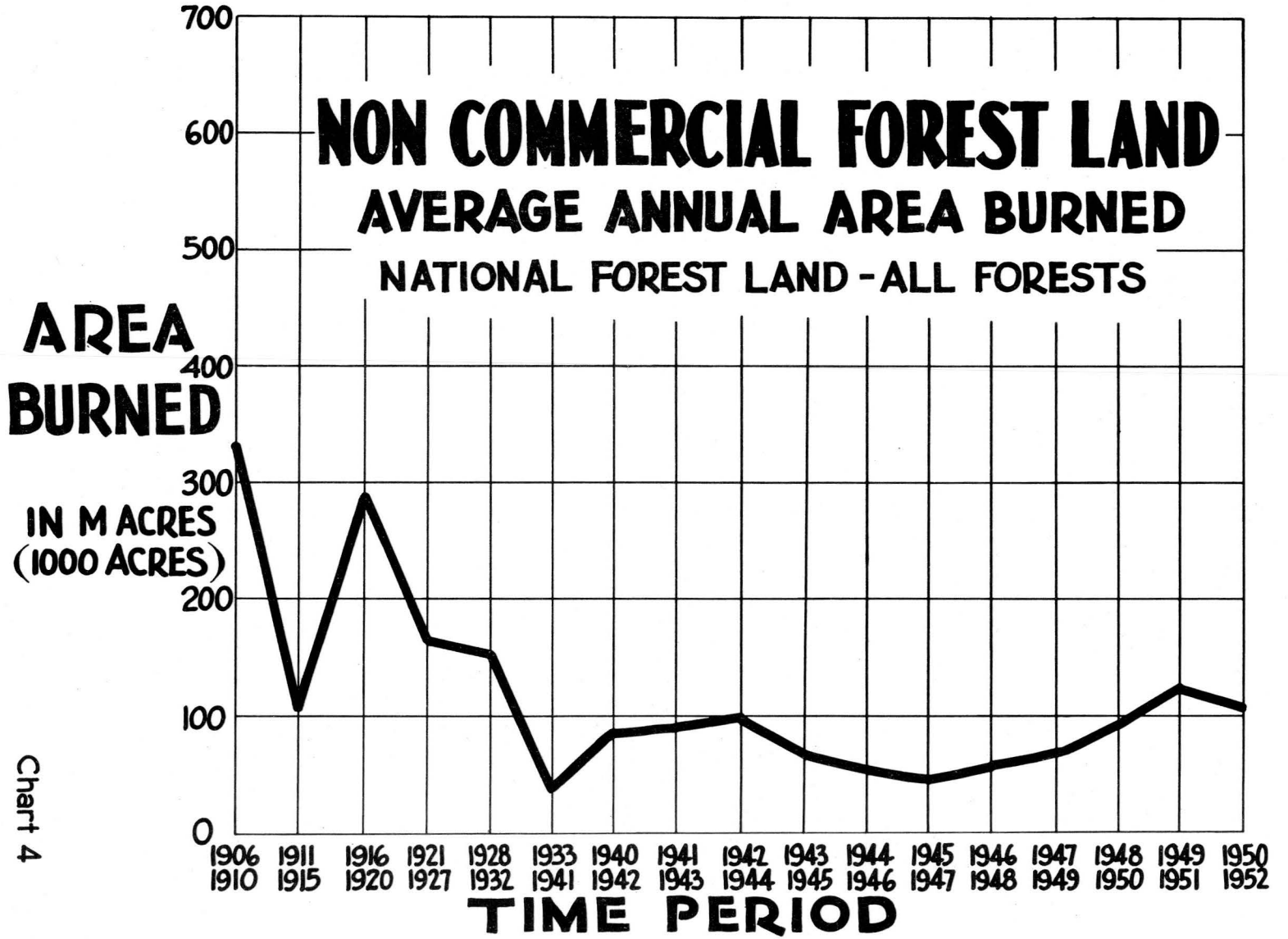

NON COMMERCIAL FOREST LAND
AVERAGE ANNUAL AREA BURNED
NATIONAL FOREST LAND - ALL FORESTS
AREA BURNED
IN M ACRES
(1000 ACRES)
700
600
500
400
300
200
100
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

Chart 4

Dollar damages are shown in two Charts (5 and 6). The first chart (No. 5) shows the fire damage in dollars to the timber resources on the national forest lands. Chart 6 shows the same thing for the non-timber resources. The dollar value of damages is shown as it was reported during the year when the damage occurred. (No changes have been made to reflect the depreciated value of the dollar). From these two charts, it will be noted that at no time in the history of the Forest Service has damages from fire, measured in values lost, been greater than at present. Upon examination of these two charts it may be seen that the 3 year running average shows a very low damage figure for the period 1940 through 1942 when total damage to timber and non-timber resources was about $800,000 per year for the period. For the 3-year periods - 1949 to 1951 and 1950 to 1952, total damages to timber and non-timber resources have averaged slightly under $7,000,000 annually. (During 1951 and again in 1953 total fire damages to resources exceeded $20,000,000). These damages, measured dollar wise, are greater than the historical bad fire period of 1906 to 1910 when the national forests had virtually no protection from fire.

It is apparent from a study of Charts 5 and 6 that resource damages must be given careful consideration when evaluating the adequacy of any protection program.

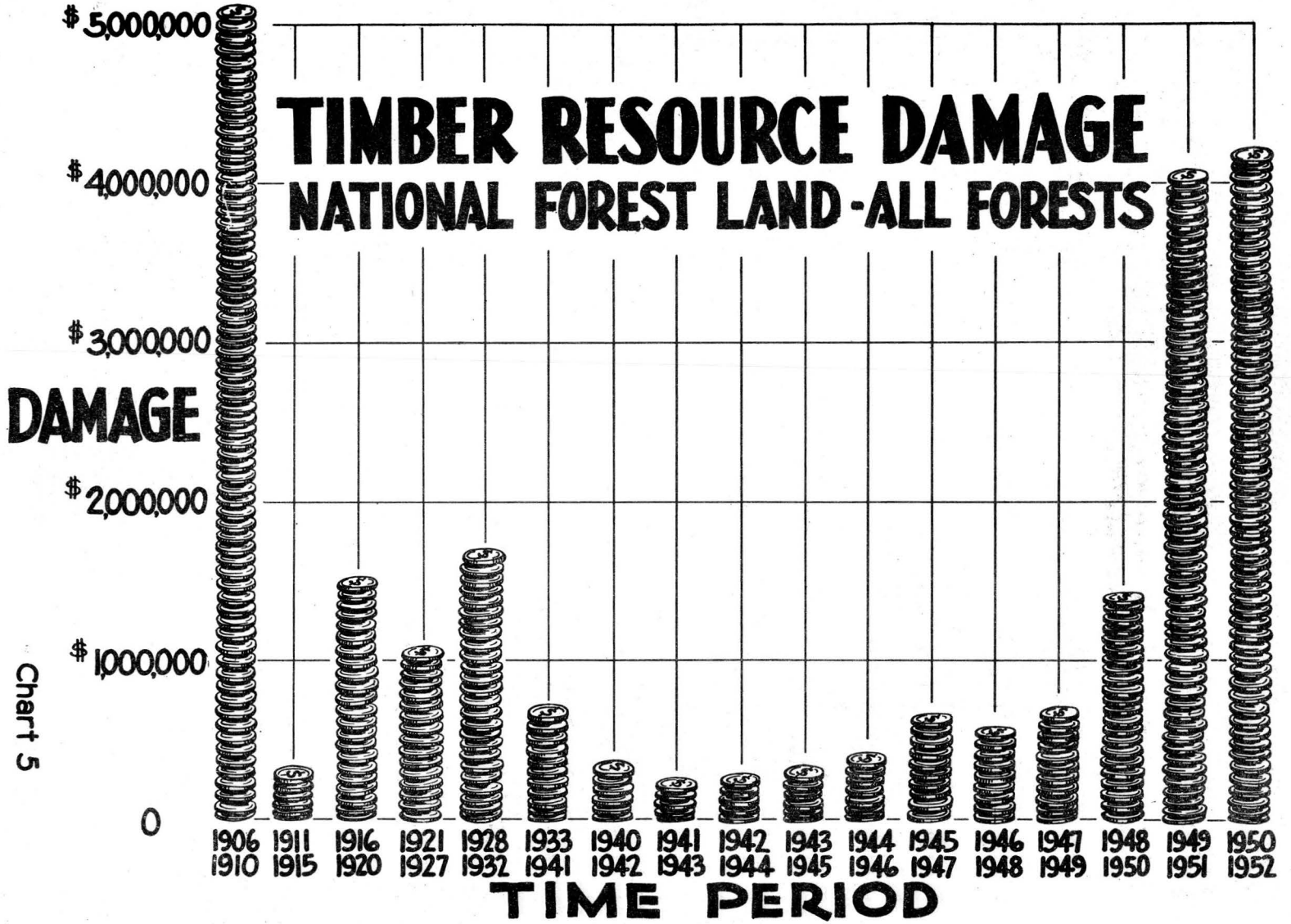

TIMBER RESOURCE DAMAGE
NATIONAL FOREST LAND - ALL FORESTS
DAMAGE
$5,000,000
$4,000,000
$3,000,000
$2,000,000
$1,000,000
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

Chart 5

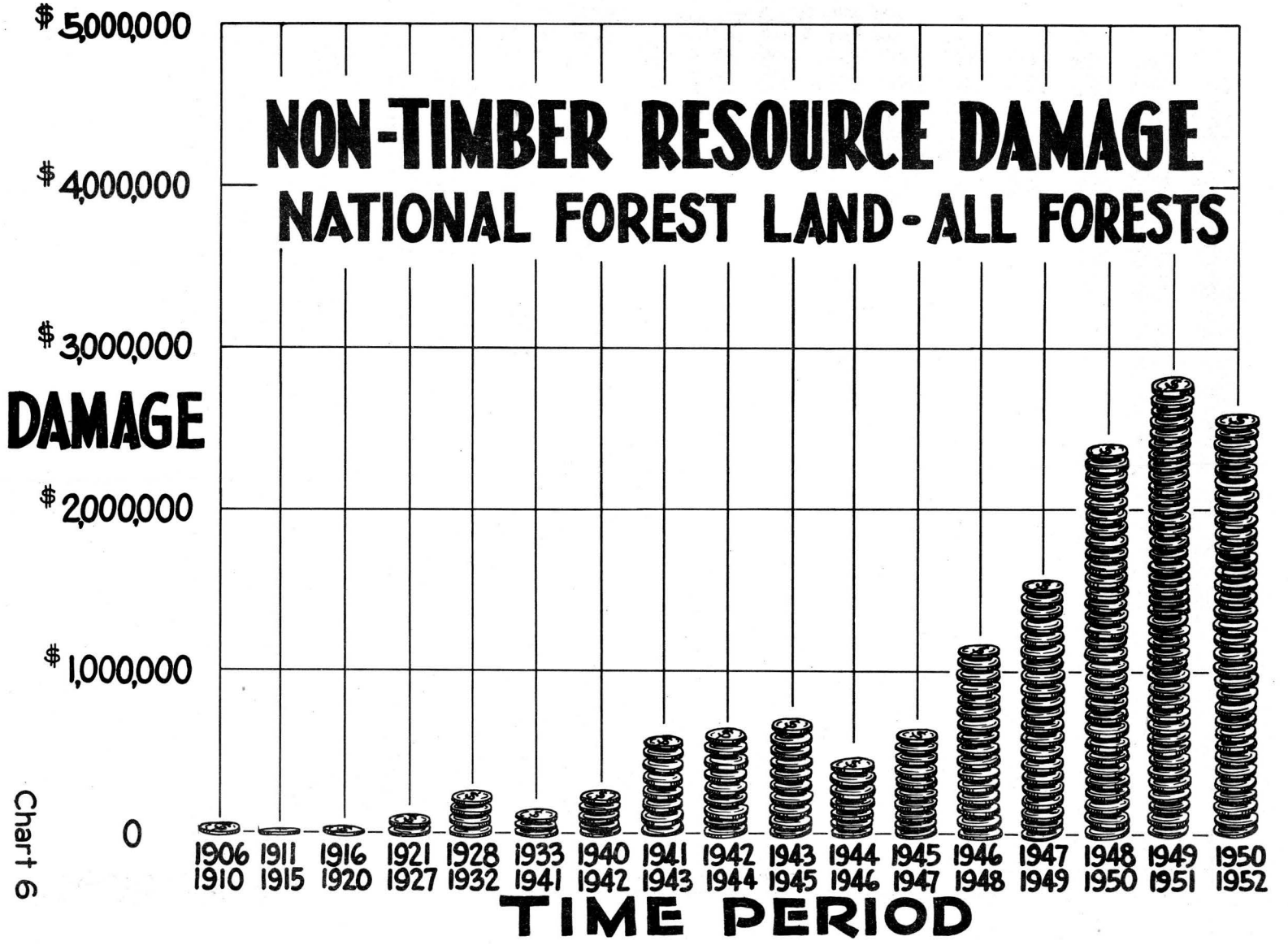
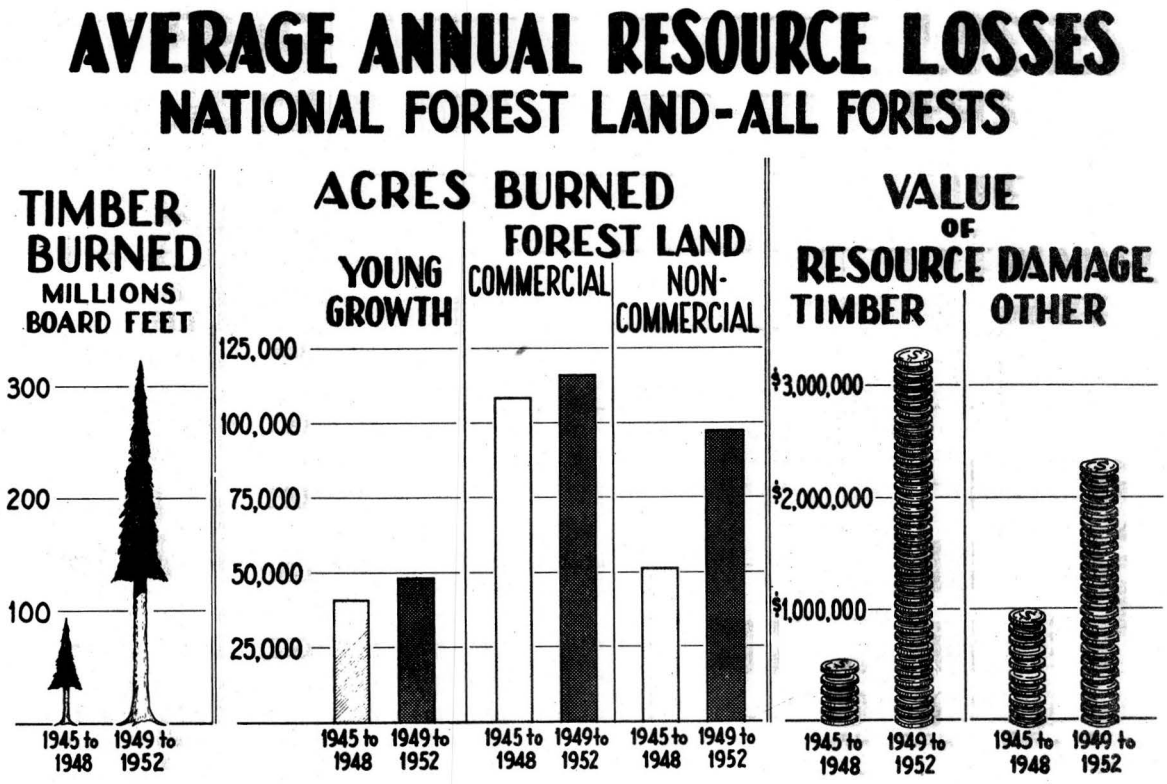

NON-TIMBER RESOURCE DAMAGE
NATIONAL FOREST LAND - ALL FORESTS
$5,000,000
$4,000,000
$3,000,000
DAMAGE
$2,000,000
$1,000,000
0
1906 1910
1911 1915
1916 1920
1921 1927
1928 1932
1933 1941
1940 1942
1941 1943
1942 1944
1943 1945
1944 1946
1945 1947
1946 1948
1947 1949
1948 1950
1949 1951
1950 1952
TIME PERIOD

Chart 6

The foregoing discussion of resource losses dealt with the period 1906-1952. Chart 6a. shows resource losses for more recent periods - 1945-1948 and 1949-1952. This chart shows that losses in the latest period have been greater than the immediate earlier period - 1945-1948. Data on this chart indicate that as the strength of the fire organization is weakened fire losses increase during periods of critical fire weather, which characterized the late period.

CHART 6a.

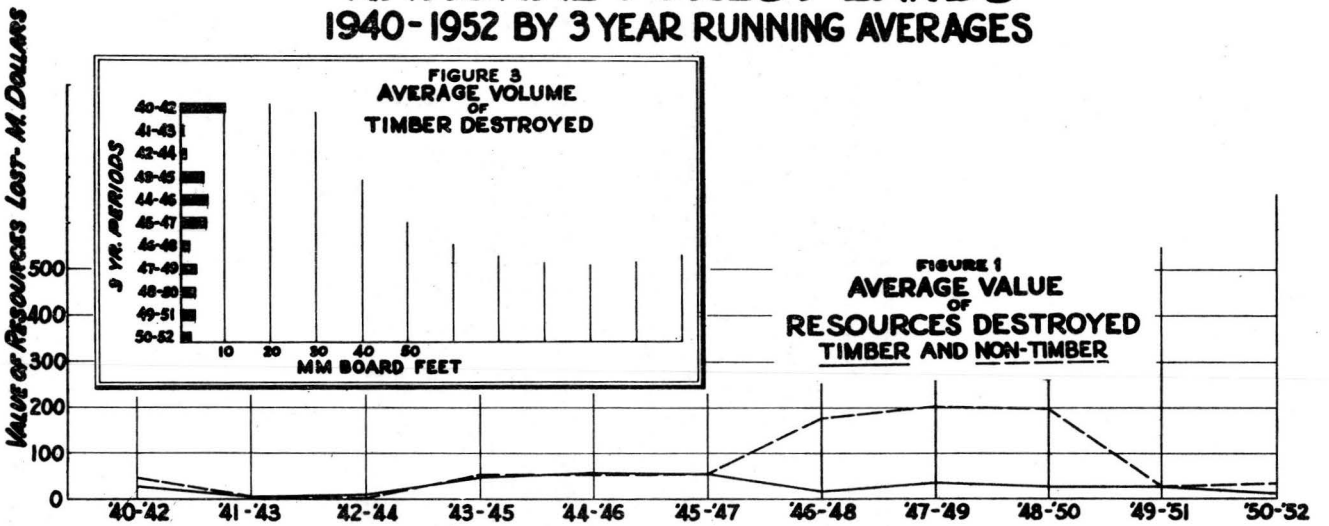


The second phase of presenting a picture of resource losses and their overall significance was made for the purpose of showing losses separately for each Forest Service region. Trends in resource losses in each region where shown by preparing a separate chart for each region on which is delineated the same information that is shown on the national charts (Charts 1 thru 6). There is one difference, however, in that the regional charts were prepared for the period 1940 through 1952 instead of for the period 1906 through 1952.

Similar to the national picture presented, the period between 1940 and 1952 is shown in a 3-year running average on Charts 7 through 15. The same scale is used on the charts for each region in order that the resource losses can be compared more readily region by region. Each of these charts have 3 figures. The bar graph at the bottom shows separately the area of non-commercial and commercial timber land which has burned. Within the bar for commercial timber land burned is also shown the area of young - growth destroyed during each period. The graph at the top of the chart (shown as figure 1) is a presentation of damages, expressed in dollars, both in timber and non-timber resources. The dollar value assigned is the dollar value as of the year the damage occurred. The inserted bar graph (figure 3) shows the resource losses in terms of timber volumes destroyed by fire.

Resource losses on national forest lands in Region 1 for the period 1940-1952 have been consistently low. Fuels, topography and numbers of fires occurring annually are as serious in Region 1 as in other regions in the United States. The expectation would be that fire losses could have been great in this region during some period in the last 13 years. However, the weather factor coupled with a great deal of good work in connection with fire operations held losses in this region to a very low level. However, the potential for grave resource losses exists in this region and with the current reduced strength of the fire organization heavy losses may be expected in the future when prolonged periods of critical weather conditions develop.

FIRE LOSSES - REGION 1
NATIONAL FOREST LANDS
1940-1952 BY 3 YEAR RUNNING AVERAGES



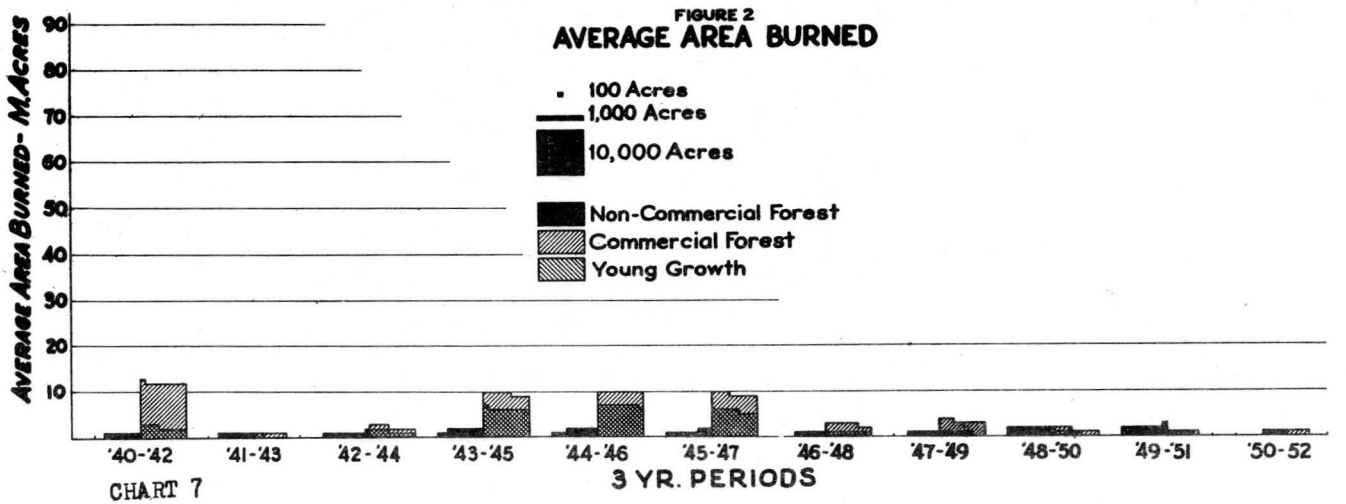
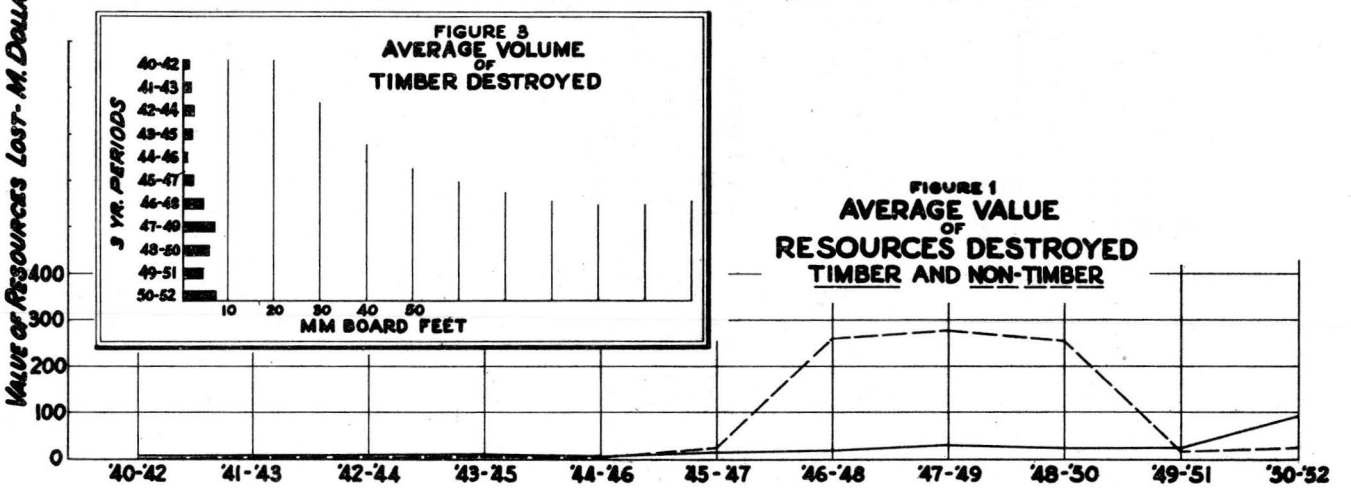


CHART 7

Timber losses in Region 2, measured in millions of board feet of timber destroyed by fire, show a steady increase since 1940, with the greatest increase developing during the period 1950-52. Non-timber losses remained at a remarkably low level during the period 1940 through 1947, increased greatly during the period 1946 through 1950, and since 1950 has again dropped to its original low level. The average annual area burned has remained at a very low level, almost consistently, throughout the past 12 years.

The Black Hills - Harney National Forests in South Dakota, the Shoshone and Big Horn in Wyoming, the San Juan in Colorado appear to be the most difficult fire forests in Region 2. The Black Hills - Harney National Forests rank as the number 1 protection problem in Region 2 with the Old Black Hills having the highest potential for heavy damage from fire. Previous fire history bears out the latter statement.

FIRE LOSSES - REGION 2
NATIONAL FOREST LANDS
1940 - 1952 BY 3 YEAR RUNNING AVERAGES



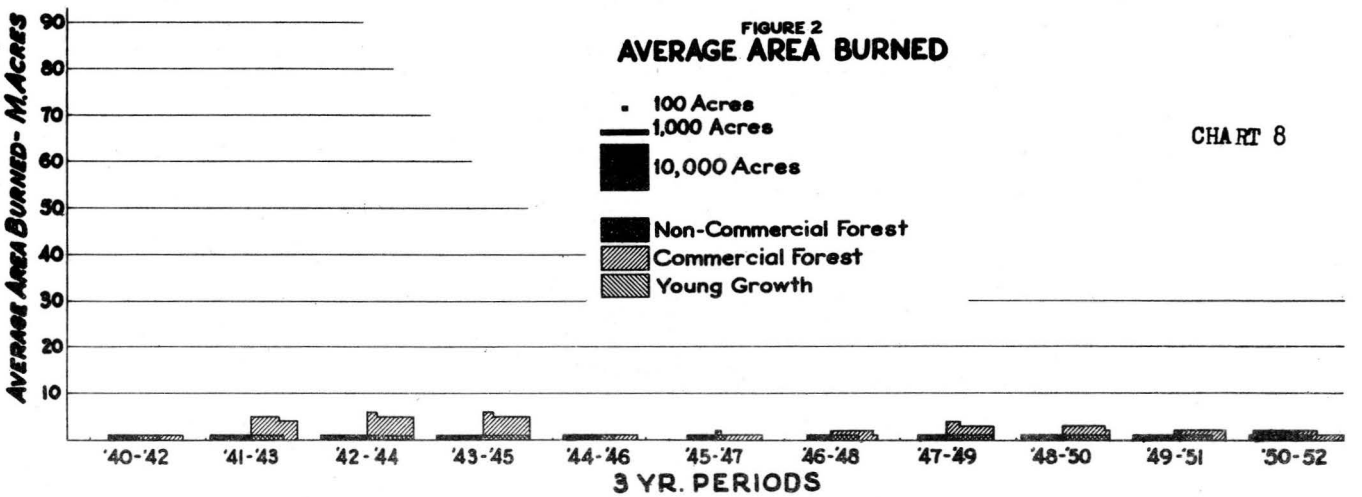


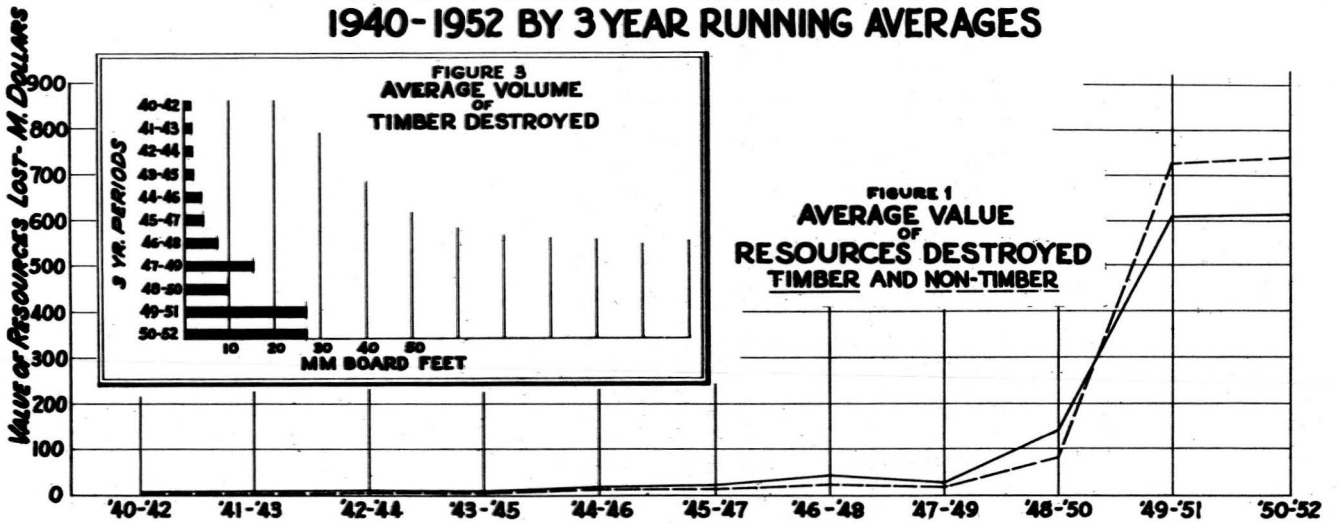
CHART 8

Timber losses in Region 3, measured in terms of millions of board feet destroyed by fire were very low during the period 1940-47. During the later years, timber losses have been increasingly severe. Non-timber resources destroyed by fire were not appreciable during the earlier period but since 1948 such losses have been occurring with increasing regulatory in this region, particularly on the Gila, Lincoln, Coconino, and Apache National Forests.

The area of young growth killed by fire shows an alarming increase. Similarly the area of non-commercial lands burned over has showed a marked increase during the later period - 1949 through 1952.

The serious drought which has prevailed in this region for the past several years has had a marked effect on the extent of the resource losses suffered in this area. It demonstrates quite forcibly that the fire protection organization is not now capable of meeting critical fire situations resulting from prolonged periods of drought.

FIRE LOSSES - REGION 3
NATIONAL FOREST LANDS
1940-1952 BY 3 YEAR RUNNING AVERAGES



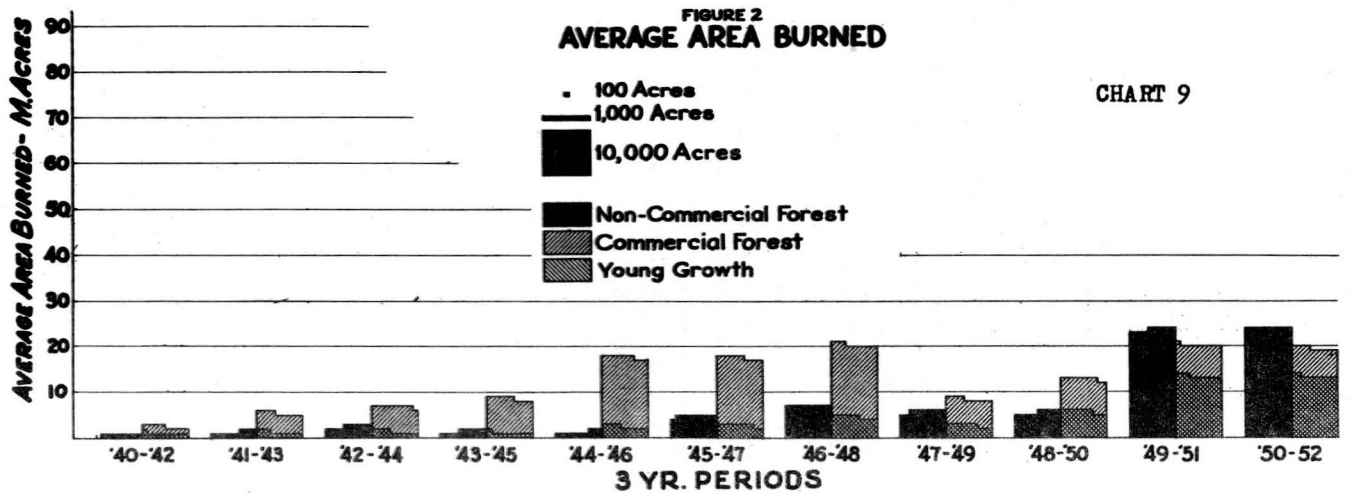
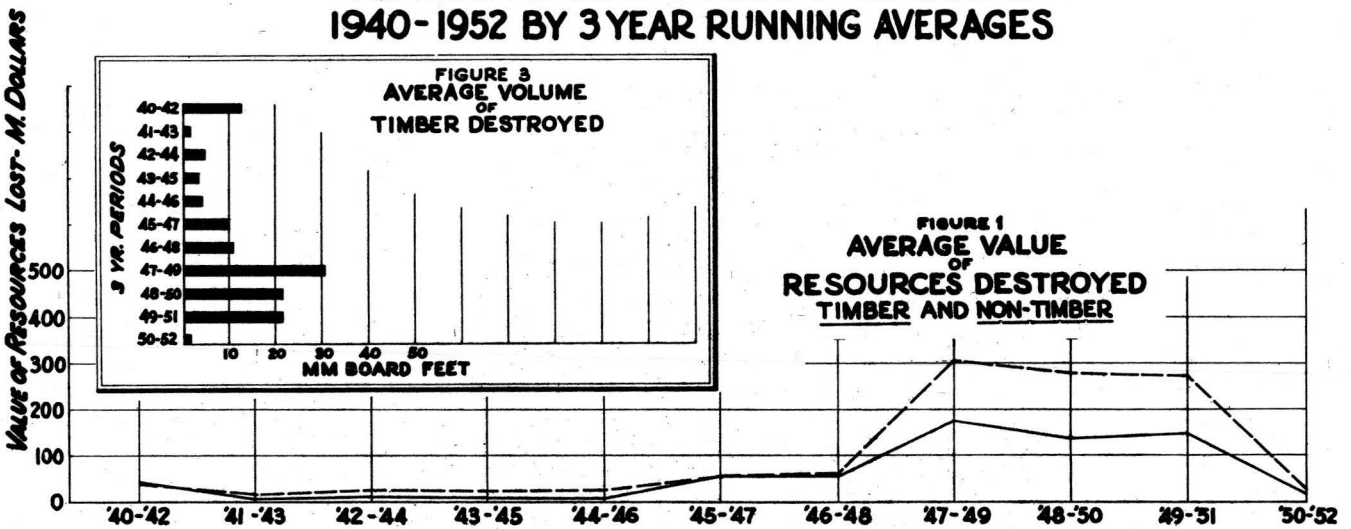


CHART 9

The chart on the opposite page pictures the fire losses on national forest lands in Region 4 by three year running averages since 1940. This chart shows that fire losses involving merchantable timber and non-timber resources were relatively light from 1940 to about 1949; remained at a fairly high level for several years, dropping off again during the past 3 years.

The Payette, Boise, Salmon, Challis and one or two other forests to a lesser degree account for most of the resource losses resulting from fire. The fire organization is not strong enough to handle all fire situations during periods of critical fire weather; particularly on the above mentioned national forests. Fire losses on other forests in the region may be expected to be severe only occasionally - probably once in 10 years.

FIRE LOSSES - REGION 4
NATIONAL FOREST LANDS
1940-1952 BY 3 YEAR RUNNING AVERAGES



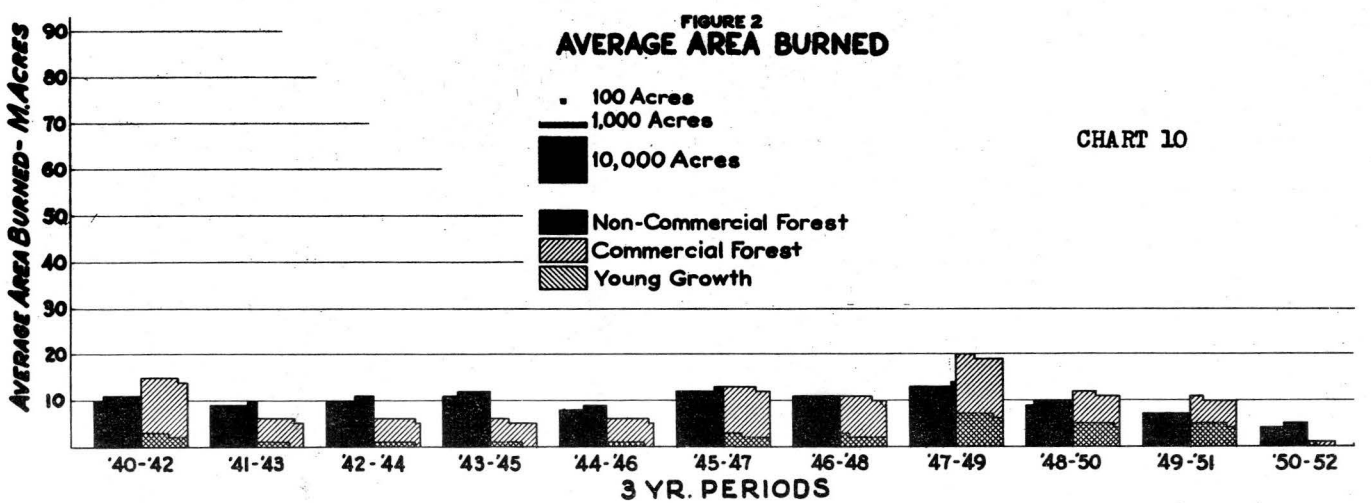


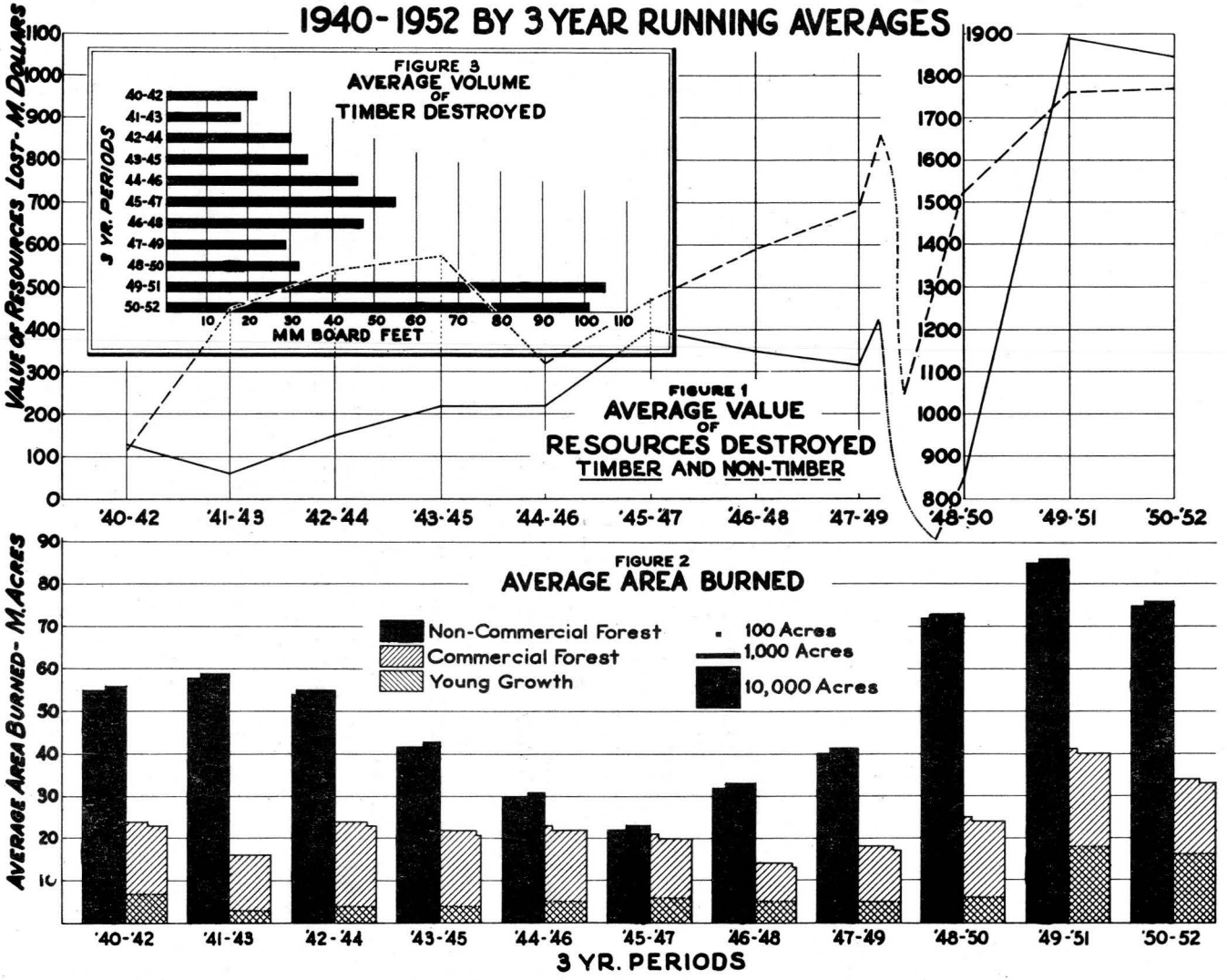
CHART 10

Chart 11 depicts the fire losses suffered by Region 5 national forests for the period 1940-1952. Merchantable timber destroyed has been steadily increasing during the period. Similarly non-timber resources damaged by fire has been on the increase. Non-commercial forest land burned over by fires was quite high during the earlier part of the period, dropped considerably during the middle of the period and again increased throughout the latter part of the period. Commercial forest land destroyed by fire was consistently high throughout the entire period. Damage to young growth was fairly heavy throughout the period with the greatest damage occurring during the last 4 years.

This chart indicates that Region 5, perennially, has been experiencing very heavy fire losses involving all resources. This chart indicates very strongly that the protection organization in this region has not been able to maintain a degree of protection satisfactory for the management of the resources. This applies quite generally to all national forests in this region excepting perhaps the Eldorado and Inyo.

CHART 11

FIRE LOSSES - REGION 5
NATIONAL FOREST LANDS
1940 - 1952 BY 3 YEAR RUNNING AVERAGES



Non-timber resources damaged by fire in Region 6 have been consistently low throughout the entire period. Timber losses have been also very low throughout the period excepting for one or two years in the early '50's. These timber losses which were exceedingly heavy, however, were the result of three or four fires. Excepting for these three or four fires timber losses in Region 6 have been consistently low for the last 12 or 14 years. Area burned, involving young growth, commercial and non-commercial forest lands has been relatively low throughout the period - however during the late years the area of young growth and commercial forest land burned over by fire has increased. This increase was the result of the three or four fires mentioned above.

This region except for an occasional serious fire appears capable of handling the fire load during average or better fire weather conditions. However, fires occurring during periods of critical fire weather in the exceedingly heavy fuels existing in the western portions of this region are proving very difficult to control with the current level of strength of the fire organization. Large and extensive fire losses may be expected during such periods unless the present fire strength is materially increased.

FIRE LOSSES - REGION 6
NATIONAL FOREST LANDS
1940 - 1952 BY 3 YEAR RUNNING AVERAGES

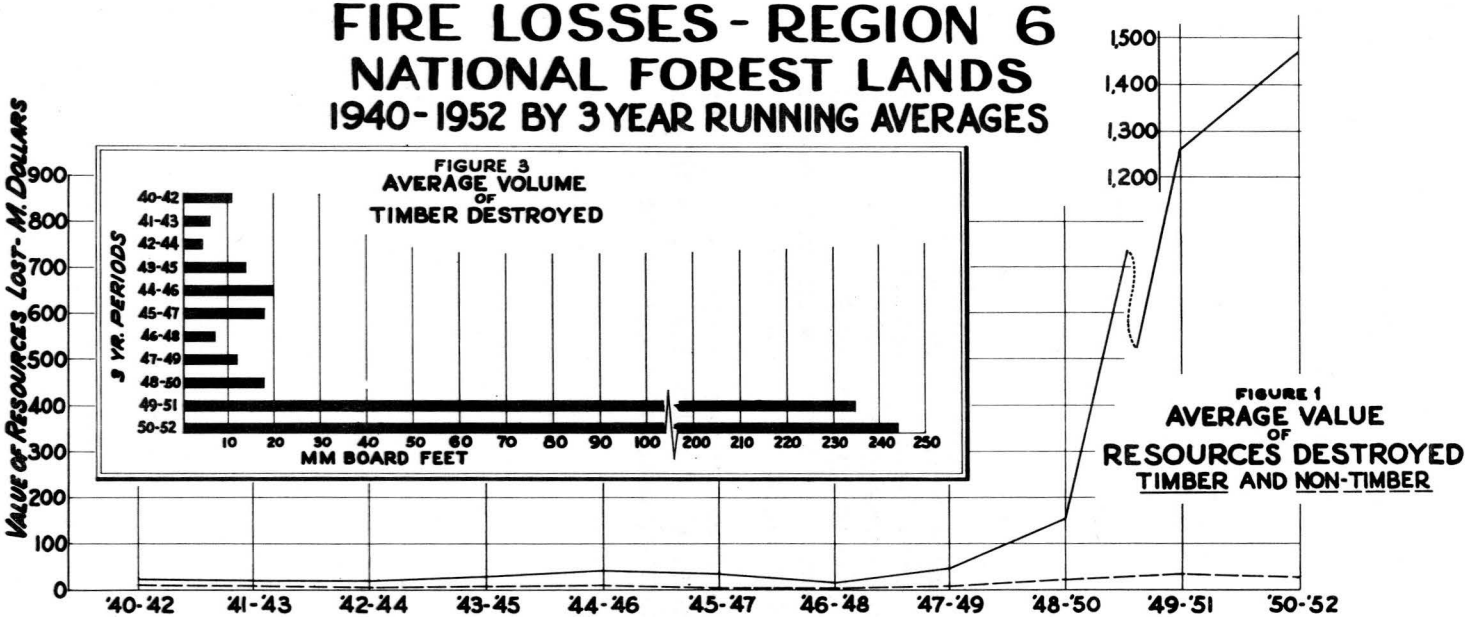


FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER

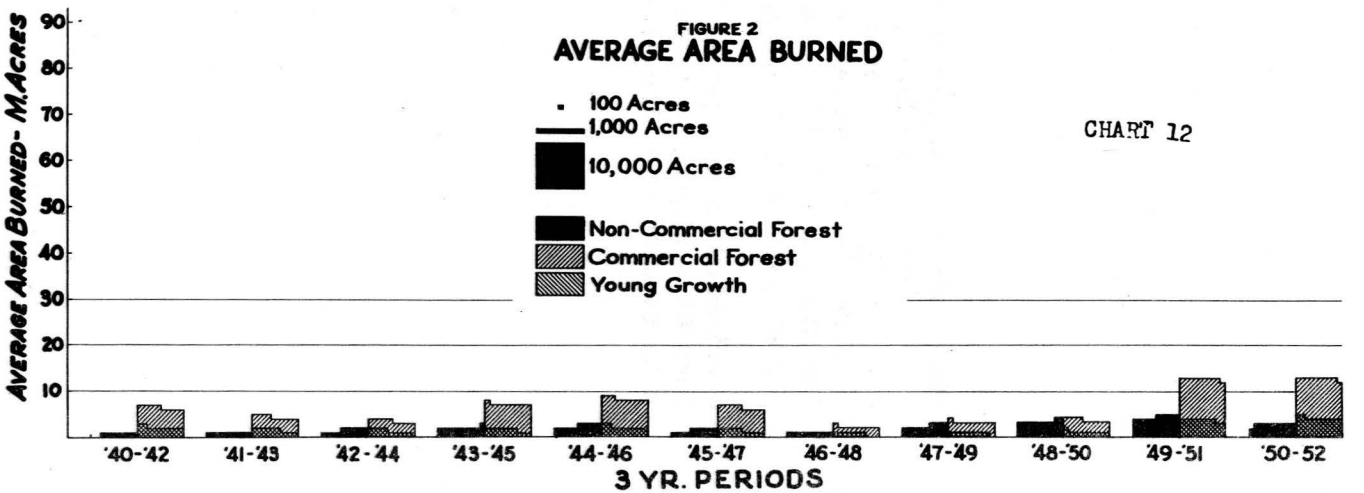


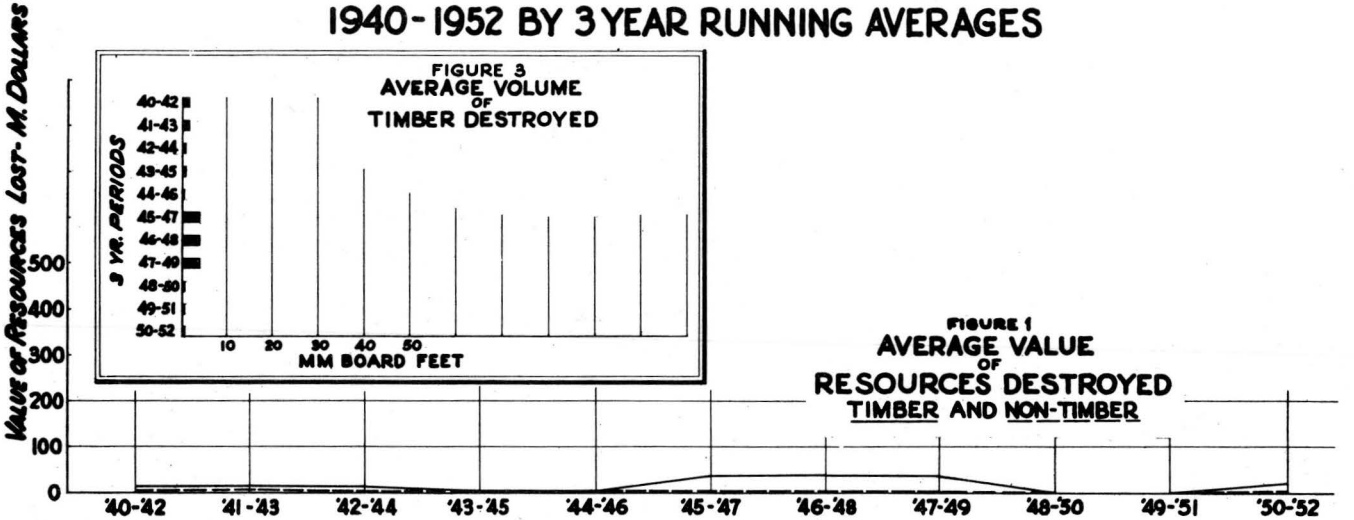
FIGURE 2
AVERAGE AREA BURNED

CHART 12

Fire losses involving timber and non-timber resources in Region 7 have been consistently low throughout the entire period. The area of commercial forests and young growth lands burned over by fire shows improvement during the period 1940 through 1952. The dry fall of 1952 brought about an increase in the area of commercial and young growth forest lands burned over.

Considered on a regional basis fire protection in Region 7 has been at a highly satisfactory level for the past 12 or 14 years when studied from the viewpoint of damage to resources.

FIRE LOSSES - REGION 7
NATIONAL FOREST LANDS
1940 - 1952 BY 3 YEAR RUNNING AVERAGES



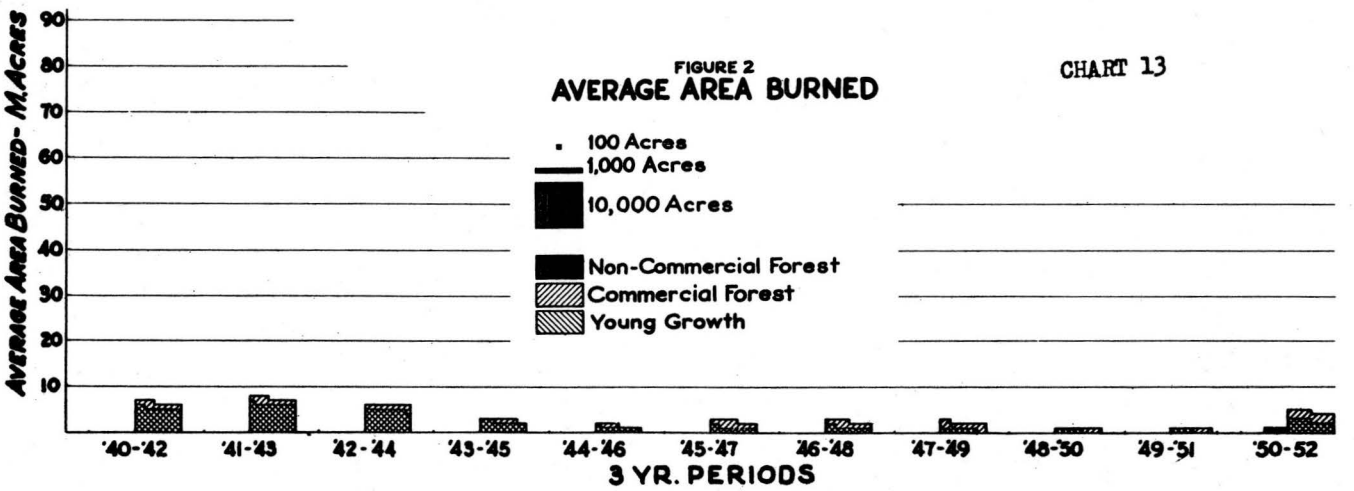


CHART 13

The chart on the opposite page shows a remarkable down trend in the area of non-commercial forest land, commercial forest land, and young growth damaged by fire during the period 1940 through 1951. The value of the timber and non-timber resources damaged by fire has been downward since 1940. The critically dry fall fire season of 1952 resulted in considerable fire damage to timber resources in this region.

Chart 14 indicates quite vividly, that there has been a steady improvement in fire protection results in Region 8. This region, which is admirably suited to the use of plows in its suppression work, has done a lot to get on top of its fire job through the use of such equipment.

Chart 15, excepting for 1952, shows a steady improvement in area burned since 1940. The losses in timber and non-timber resources have been consistenly low throughout the period. Some trouble was experienced in 1952, characterized as one of the critically dry falls, in that the area burned and damaged to resources increased. However, the increase though considerable did not approach the heavy damage of the earlier years.

c. Summary.

During the early history of the Forest Service terrific losses in resources occurred on national forest lands in the United States. Through increased protection facilities and efficiency, these overall losses were brought down from a high in 1910 to a low during the period of 1941-43. Fire losses to resource values on national forest lands remained consistently low during the early 1940's. The alarming picture brought out in the analysis is that during the past few years the trend in resource losses is going upward rather than continuing downward as it should. For each of the presentations showing resource losses, this upward trend has appeared in the past few years. It has been so great that it shows up in the overall national figures in spite of the fact, as is well known, that the law of averages always has the effect of leveling out bad losses in any one region during any one year. When values of the properties being destroyed are considered, the upward trend in losses is even more staggering and significant.

Data depicted by these 15 charts show very strongly that protection from fire is not now adequate for large areas of national forest lands in the United States.

FIRE LOSSES - REGION 8
NATIONAL FOREST LANDS
1940 - 1952 BY 3 YEAR RUNNING AVERAGES

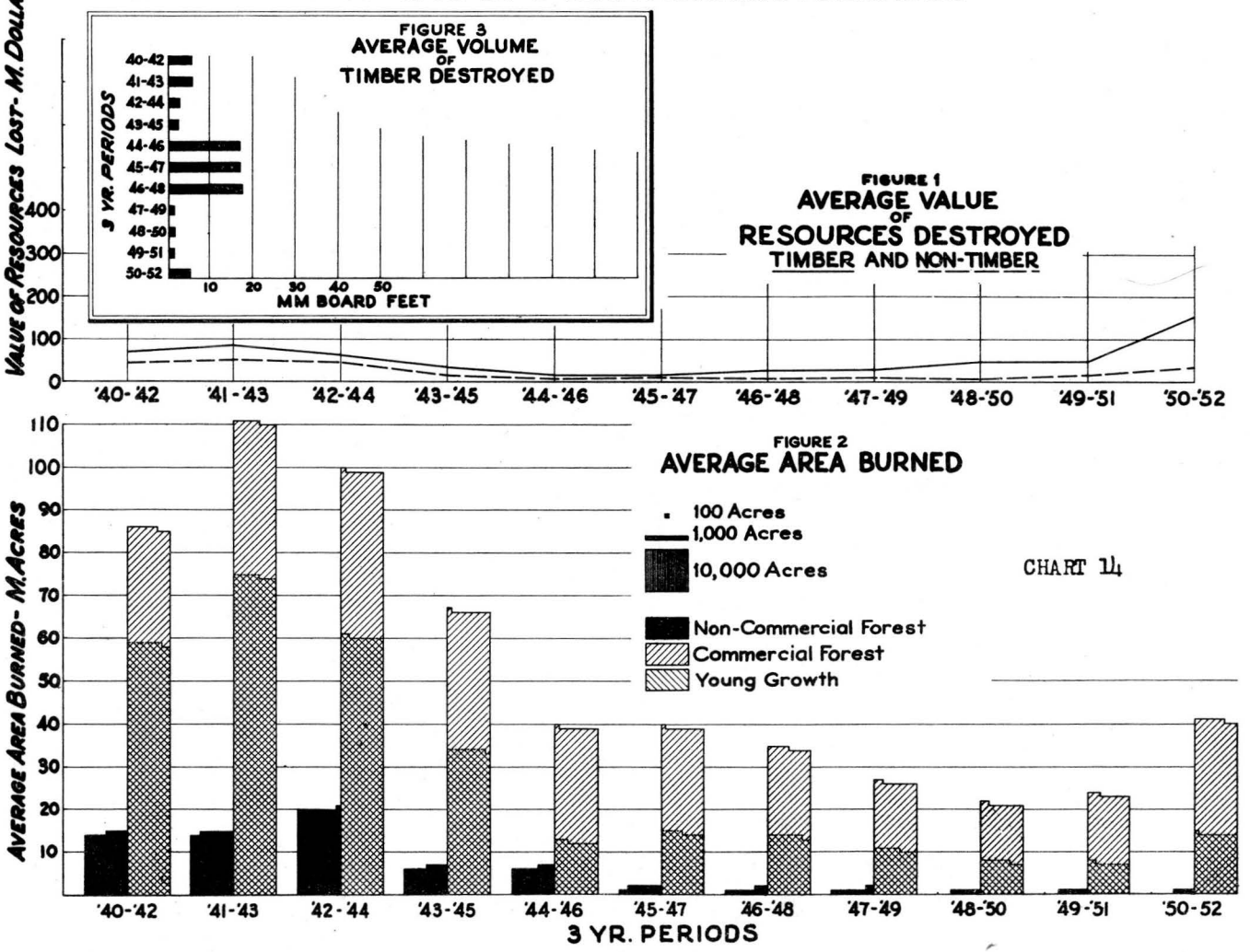


CHART 14

FIRE LOSSES - REGION 9
NATIONAL FOREST LANDS
1940-1952 BY 3 YEAR RUNNING AVERAGES

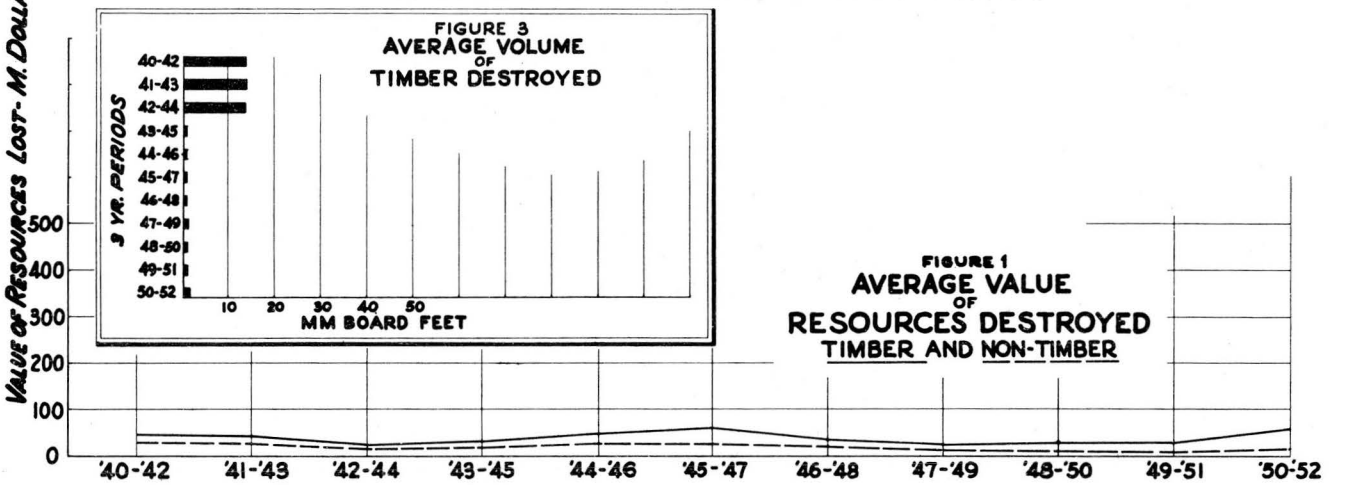


FIGURE 3
AVERAGE VOLUME
OF
TIMBER DESTROYED

FIGURE 1
AVERAGE VALUE
OF
RESOURCES DESTROYED
TIMBER AND NON-TIMBER

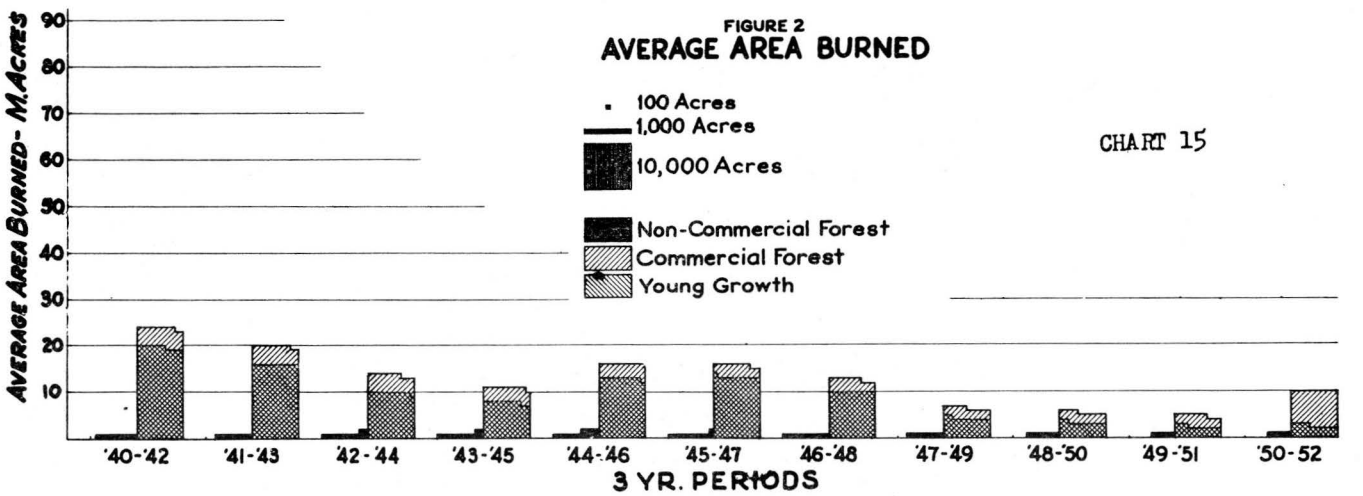


FIGURE 2
AVERAGE AREA BURNED

CHART 15

2. Adequacy of protection from fire as determined from a study of sample management units.

a. The Analysis.

Weather conditions have a marked bearing on resource losses. Also, due to improvements in mechanization, organization, and other factors, past records of fire losses may not be a measure of the current situation. Statistical data, for this reason, may not present a true picture of the actual status of protection as it exists today. Also, statistical data, when applied to wide areas, may indicate that overall protection is satisfactory. Yet for individual management units, working circles and other similar areas disastrous losses may be occurring almost annually.

For this reason, it was believed an objective review of the current and past status of protection from fire for 18 selected national forests and ranger districts was essential. When analyzing the current and past status of protection for certain ranger districts the elements considered were: (1) fire business, (2) changes in fuels, (3) timber use, (4) fire weather, (5) fire weather and prevention, (6) fire weather and area burned, (7) basic man power in 1953 compared to former years, (8) suppression man power compared to earlier periods, and (9) advances in fire equipment.

From a study of the foregoing elements (1 through 9) it was possible to give an informed judgment decision as to the current and past status of protection from fire for each of the ranger districts analyzed.

b. Analysis Digest.

Introduction.

Is fire control adequate on the national forests? Where are we going in fire control? What are the trends? Have we made progress or lost ground in recent years? Is protection adequate during critical years? Or adequate only during average or easy years?

Answers to the above questions are of paramount interest to the Forest Service. To get the answers a special survey was made of 18 national forests -- 2 forests in each region except Alaska.

Summary of Fire Business on Sample Units.

Fire control problems vary widely throughout the United States. No two national forests have identical problems. However, a study of sample units which represent a wide variety of fire control problems can indicate trends. Furthermore, an analysis of these trends can yield valuable information for investigating the general status of fire control management.

The 18 national forests used in this study had enough fire business and a wide enough variety of fire business to provide a good sample of Forest Service fire problems. Here is a summary of the fire business on these 18 national forests during the 16-year period 1938-1953:

Total fire occurrence - 39,774 (16,174 lightning and 23,600 man-caused fires).

Total area burned - 843,452 acres.

One forest had an average of only seven fires per year; another averaged 668 fires per year. The average fire occurrence on the 18 sample units was 138 fires per year - 59 percent man-caused and 41 percent lightning-caused.

One forest burned an average of only 17 acres per year; another averaged 10,668 acres burned per year. The average annual burn on the 18 national forests was 2,929 acres.

Fuels.

Fuels are the stuff that burn in a forest fire. The type of fuels in an area being protected from fire has a great bearing on the size and nature of the job. Therefore, it is important to know something about fuels and about the changes that occur in fuel types. On the 18 national forests fuels were distributed as follows:

Period	Percent of Area In		
	Low Hazard Fuels	Medium Hazard Fuels	High Hazard Fuels
Pre-war 1938 - 41	38	37	25
War 1942-45	36	38	26
Post-war 1946-49	34	39	27
Recent 1950-53	34	38	28

As shown above the area of high hazard fuels has increased steadily. The increase on the 18 national forests from the pre-war to the most recent period amounts to over 800,000 acres. If this same rate of increase could be applied to the entire national forest system, it would mean that some 6,000,000 acres of high hazard fuels have been added since 1938. In any event, the increase of high hazard fuels is great enough to cause serious consideration of the contributing factors.

Timber Use.

The harvesting of forest products and fire control are associated in many ways. Timber sales open up new country, and facilitate access to many areas. Timber sales also bring changes to fuel types, introduce a new potential for fires to start, provide an opportunity for the use of fire in fuel reduction, and present a new challenge for the protection of the future forest crop. This influence of timber harvesting on the fire control job on the 18 sample national forests may be seen in these figures:

Period	Annual Timber Cut M. Bd. Ft.
1938-41	219,000
1942-45	432,000
1946-49	599,000
1950-53	817,000

Fire Weather.

Weather is probably the most important variable influencing the nature and scope of fire control. The importance of weather was noticed in almost every phase of the study.

Weather influenced fire occurrence, fire prevention, area burned, and in turn the requirements for manpower, equipment, and FF dollars. During the 16 years of the study fire weather was classified as follows:

Year	No. Forests Having - Easy Fire Weather	Average Fire Weather	Critical Fire Weather
1938	6	8	4
1939	3	7	8
1940	2	10	6
1941	6	9	3
1942	1	11	6
1943	3	11	4
1944	8	9	1
1945	7	8	3
1946	6	10	2
1947	6	8	4
1948	8	7	3
1949	2	11	5
1950	6	6	6
1951	4	9	5
1952	4	7	7
1953	3	9	6

Fire Weather and Fire Prevention.

Fire weather influences the occurrence of man-caused fires. In the study this influence was as follows:

	Average Annual Number Of Man-Caused Fires Per Forest
Easy Fire Weather	48
Average Fire Weather	77
Critical Fire Weather	137

The fact that the greatest number of man-caused fires occur during critical fire weather clearly shows that fire prevention efforts should be increased during such periods. A special study was made of man-caused fires during critical fire weather to determine the results of fire prevention programs. This study shows that man-caused fires were reduced in the war and post-war periods, but increased again during the most recent period. The figures are as follows:

Period	Average Annual Number of Man-Caused Fires per Forest In Years of Critical Fire Weather
1938-41	192
1942-45	167
1946-49	58
1950-53	121

Careful examination of the above trends in man-caused fires shows that the low occurrence in 1946-49 is due mainly to an absence of critical years in certain southern and central state forests. Therefore, it is evident that a rather steady although small reduction of man-caused fires has been obtained. It is also evident that the most important fire prevention problem occurs in critical fire weather. Success in fire prevention in all regions calls for careful evaluation of fire danger rating and fire weather forecasting aids in the preparation of plans and in the management of action programs.

Fire Weather and Area Burned.

As fire weather becomes more severe, the area burned becomes larger. This fact was vividly demonstrated in the sample units as follows:

	Average Annual Burn Per Forest - Acres -
Easy Fire Weather	687
Average Fire Weather	1938
Critical Fire Weather	6935

Analyses of area burned data on all 18 forests showed no significant trends in increase or decrease of fire sizes during the 16-year period. Fuel types and other variables influencing fire behavior must be considered to determine significant trends. However, it is clearly evident from the study that the great challenge in fire suppression occurs when weather factors favor the rapid spread of fires.

Basic Manpower.

This phase of the study was aimed at determining the general status of the basic* P&M-financed fire control organization. This is the basic prevention, presuppression and initial-attack organization -- the people who have fire control as their primary job during the fire season. They are the fire control staff men at the supervisor's office, the district fire control assistants, the lookouts, the smokechasers, the initial-attack crew members, and other key men such as dispatchers, tank truck operators, etc. What is the status of this basic organization? Is it stronger or weaker than in former years?

We asked this question -- what has been the number of regularly planned,* P&M-financed personnel on fire duty during the fire season?

*P&M interpreted to include Fire Coop. and Flood funds

The combined totals for the 18 national forests are as follows:

Four Year Period	Average No. of Regularly Planned P&M Financed Personnel on Fire Duty During Peak of Fire Season*						
	Supervisor's Office	District F.C. Asst.'s	Lookouts	Smokechasers & Fire Guards	Crewmen	Other	Total
1938-41	42	78	349	246	299	143	1157
1942-45	42	88	391	267	184	111	1083
1946-49	40	98	291	253	214	124	1020
1950-53	38	97	253	251	183	187	1009

During the period studied, the basic fire organizations were reduced by 148 positions. All of the reductions were in lookouts, crew men, or staff assistants in the supervisor's office. Increases were made in district fire control assistants and specialist personnel such as dispatchers, radio operators, etc. Little change was effected in smokechasers although there were 16 fewer men in 1953 than during the war-time peak.

The greatest change in manning has occurred in the detection system. During 1950-53 there were 138 fewer lookouts manned than during the peak war-time period. Notes attached to forms returned from the various forests indicate that still further reductions will be necessary. No attempt was made to analyze the impact of this drastic change on detection efficiency. However, it is clear that such studies are needed on each forest.

Suppression Manpower.

What is the status of the second line organization -- the forces called into action immediately behind the basic organization? The following figures show the general trends in suppression manpower during the 16-year period 1938-53:

Four Year Period	Average No. of Personnel Available for Fire Suppression Duty			
	Forest Service Organized Crews	Cooperator Crews	Other Personnel Available Within 8 Hours	Total
1938-41	7516	2515	26,569	36,600
1942-45	1841	2994	9,270	14,105
1946-49	1224	3790	11,670	16,684
1950-51	1113	3722	10,710	15,545

The total loss in suppression manpower amounts to over 20,000 men -- more than the equivalent of an entire infantry division! Most of this loss in available suppression manpower is due to the elimination of CCC camps. The trend in manpower loss

which is most serious is the continuing reduction of organized Forest Service crews. The survey shows that increased reliance is placed on cooperator crews.

Fire Equipment.

Each of the two previous phases of the study have shown a loss in manpower. As shown below the opposite is true for fire equipment:

Four Year Period	Average No. of Pieces of Equipment Owned by Forest Service or Readily Available by Rental				
	Tank Trucks	Plow Units	Bull-dozers	Patrol Aircraft	Helicopters
1938-41	64	33	183	30	0
1942-45	100	22	188	38	0
1946-49	156	28	252	64	3
1950-53	211	34	320	78	4

These statistics illustrate rather vividly that fire control is changing to a mechanized operation. On just 18 national forests the net gain in equipment includes 147 tank trucks, 1 plow unit, 137 bulldozers, 40 patrol aircraft and 4 helicopters. This trend shows also that the character of the job is changing -- different equipment calls for new systems of fire management and new techniques in fire suppression.

Status of Protection.

Each national forest in the study was asked to evaluate protection status in easy, average and critical years. What percent of the ranger districts have adequate protection in average years? In critical years? The answers were:

Period	Percent of Ranger Districts With Adequate Protection In	
	Average Years	Critical Years
	-Percent-	
1938-41	81	45
1942-45	49	19
1946-49	70	27
1950-53	73	27

The significance of the above evaluation depends in part upon the definition of adequate protection. For example, the 18 national forests burned nearly 850,000 acres in 16 years or about 3 percent of the 28,000,000 acres within their protection boundaries. The average annual burn was .19 percent of the area protected. Does this constitute adequate protection?

c. Summary.

Determinations of the adequacy of protection must be evaluated on each individual unit. Area burned cannot be the sole measure of adequate protection. Values at stake, damage, and long-range effects of fires on land productivity all have a bearing on a rating of protection adequacy. No attempt was made in this study to make such evaluations. However, the study does provide a basis for the following conclusions:

1. Protection is not adequate during critical fire weather on most national forests. Identification of the periods of critical fire weather and the development of action programs to meet the special requirements of these periods are top-priority jobs. Effective and economical fire control during such periods calls for the development of highly flexible organizations.

2. The adequacy of protection during average fire weather depends largely upon fuel conditions. Fires starting in high-hazard fuels cause severe damage. Many large and costly fires are occurring under average fire weather situations in worse than average fuels. Development of adequate protection for these situations calls for identification of trouble-making fuels, reduction of such fuels and programs to prevent creation of additional areas, and better fire prevention and suppression techniques tailored specifically for the fuel types in question.

3. Fire control is almost universally adequate during easy fire weather. The challenge here is to identify these periods of easy weather and then do everything possible to effect justifiable savings in the cost of protection during such periods.

B. Trends in Protection Strength. (All national forests)

1. Presuppression forces.

a. The Analysis.

Tables were prepared which compared man months of seasonal protection employees such as lookouts, fireman, suppression crew members, patrolmen, dispatchers, etc., available in F.Y. 1953 and F.Y. 1945.

b. Analysis Digest.

Total man-months of seasonal fire protection employees employed from P&M and Cooperative Funds.

	Regions									
FY 1945	1	2	3	4	5	6	7	8	9	TOTALS
Lookouts	1891	150	375	586	1198	1300	425	1247	1168	8340
Firemen	572	-	276	633	807	924	212	210	350	3984
Suppression Crew Members (Incl.Smokejumpers)	91	350	15	139	4770	627	-	100	335	6427
Patrolmen	103	-	10	116	819	602	8	-	-	1658
Dispatchers	300	-	37	46	694	480	71	88	-	1716
Tank Truck Operators	33	-	0	-	-	81	-	-	-	114
TOTALS	2990	500	713	1520	8288	4014	716	1645	1853	22,239

	Regions									
FY 1953	1	2	3	4	5	6	7	8	9	TOTALS
Lookouts	651	174	292	215	927	1012	257	903	747	5178
Firemen	443	-	302	424	638	1002	172	140	327	3448
Suppression Crew Members (Incl.Smokejumpers)	387	425	15	229	4167	761	-	140	14	6138
Patrolmen	79	-	7	118	953	382	3	-	-	1542
Dispatchers	348	10	52	95	668	431	102	63	-	1769
Tank Truck Operators	102	-	0	3	-	81	-	-	-	186
Law Enforcement	-	-	-	-	-	-	-	36	-	36
TOTALS	2010	609	668	1084	7353	3669	534	1282	1088	18,297

c. Summary.

Foregoing data show there have been a decrease in available presuppression forces since 1945. This decrease varied from 41.3% in Region 9 to 6.3% in Region 3. Region 2 was the only region showing an increase (21.8%) in protection strength in 1953 compared to 1945. The overall drop in presuppression strength from the 1945 level amounts to about 18%. If P&M 101 manning in 1945 was compared with P&M 101 manning in 1953 the drop in presuppression strength would approximate 35%.

Hence Cooperative funds received for the protection of privately owned lands was largely responsible for maintaining the presuppression strength up to current levels.

2. Mechanization of fire fighting.

a. The Analysis.

Similar charts comparing the number and kinds of Forest Service owned specialized equipment and equipment readily available from cooperators such as tractor plows, radios, tank-trucks, power saws, aircraft, etc., in C.Y. 1944 and C.Y. 1952 were made to indicate the direction we are moving in mechanization. Number of fires on which initial attack was made and miles of fire line constructed or number of fires controlled with tank trucks, plows, etc., during each of the above years were also developed.

b. Analysis Digest.

Charts 16 and 17 provides information on the amount of mechanized fire equipment and electronic communication equipment available in 1952 compared with 1944 both as to Forest Service and Cooperator owned equipment.

Chart 18 tabulates for 1951 and 1952 by regions the number of Class B and larger fires, together with the number and percent of those fires on which line building equipment was used and the amounts of fire line built by equipment.

Some of the advantageous results which analyses showed have occurred from the rather extensive use of power equipment in Region 8 was discussed. In discussing these data it was acknowledged that Region 8 enjoys topographic assessibility advantages over most regions, that many regions could not compete with Region 8's percentage of equipment - fought fires even though the other regions had enough equipment on hand. However, that to the degree conditions in one area make use of equipment feasible proportionately like advantages may be attainable.

As a step in developing Region 8's equipment experiences they placed on Chart 19 the types of equipment used, the ground cover conditions each class of equipment is best adapted for (expressed broadly in timber types), the width of fire line constructed and the average rate of production of satisfactory fire line per hour.

Chart 20 shows Region 8's suppression results during 3 years preceding start of mechanization, and then over an 8 year period, the effect on suppression expenditures, average area loss per fire, and extra period fires as their equipment facilities increased.

FIRE CONTROL EQUIPMENT AVAILABLE

	BULL DOZERS				TRACTOR PLOWS				TANK TRUCKS				AIR CRAFT				PORTABLE PUMPERS				POWER SAWS			
	F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR		F. S. OWNED		COOPERATOR	
	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952
R-1	71	30	134	447	1	4	22	50	13	41	5	24	–	2	14	38	147	123	17	48	17	179	35	571
R-2	40	40	80	120	2	2	–	-	6	11	10	30	–	–	10	50	10	40	15	45	4	40	50	200
R-3	5	34	34	102	–	9	4	2	–	4	4	15	–		8	27	10	2	2	14	–	17	17	191
R-4	2	5	60	190	1	–	–	–	3	18	25	52	–	1	10	30	83	75	4	4	5	40	15	50
R-5	19	20	152	559	–	1	–	2	144	242	167	485	–	4	7	77	104	168	26	56	3	37	45	534
R-6	3	25	999	3879	20	11	–	–	17	154	200	555	–	6	105	3 *M	125	205	500	1033	3	200	100	6,000
R-7	–	1	12	45	–	–	–	–	3	13	6	18	–	–	2	15	43	34	10	22	–	8	–	90
R-8	–	18	10	100	24	122	15	150	10	16	25	20	–	–	15	20 *M	6	8	3	10	–	–	5	200
R-9	21	27	71	238	48	45	18	27	37	48	26	54	1	3	26	48	126	123	35	57	–	13	30	504

*Military Aircraft Available

CHART 16

FIRE CONTROL EQUIPMENT AVAILABLE
RADIO

	FIXED SETS				VEHICLE INSTALLATIONS				HAND & PACK			
	F.S. OWNED		COOPERATOR		F.S. OWNED		COOPERATOR		F.S. OWNED		COOPERATOR	
	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952	1944	1952
R-1	235	313	-	-	9	57	-	-	-	313	-	-
R-2	5	125	10	20	6	95	100	200	100	125	10	20
R-3	-	92	-	5	-	44	-	25	158	314	-	-
R-4	20	120	20	33	-	15	-	50	150	290	-	-
R-5	208	405	3	82	54	483	33	305	512	640	-	71
R-6	100	581	-	500	20	220	300	600	360	470	-	559
R-7	43	61	-	6	-	16	-	42	61	128	-	28
R-8	104	238	-	50	64	368	-	100	140	238	-	50
R-9	128	176	-	8	6	93	-	28	220	289	-	16
TOTAL	843	2111	33	704	159	1391	433	1350	1701	2807	10	744

CHART 17

To relate the fire job to funds, it was necessary for them to convert fire data to fiscal years. An important fact they noted in preparing this chart is that fiscal books are not kept in a way which would permit segregating suppression expenditures on equipment fires from the cost of hand tool fires. The figures on chart 20 include the cost of equipment-fought fires and also the cost of about 45% of Region 8 fires which were suppressed with hand tools. Costs involved in man power suppression have gone up in the south in about the same proportion as elsewhere. That means that savings and suppression costs on equipment fought fires were considerably greater than column 4 and 5 on chart 20 indicate.

It is understood that in introducing figures comparative between Region 8 and the remainder of the regions, it was done because by that process only can the relative effects of equipment be assessed. Direct comparisons would not be statistically possible. Column 4 of Chart 20 indicates that cost savings on the equipment fires have been great enough to absorb the universal inflation of unit costs in the many categories and hold Region 8's total suppression cost roughly equal to those of 5 previous years. Column 5 of Chart 20 when compared with column 1 of this chart does reveal that Region 8 is spending for suppression a significantly decreasing portion of the total Forest Service FFF expenditure.

Considering that the prime objective of fire fighters is to reduce size of burned areas and resource losses, the burned area figures are perhaps more significant than the expenditure figures. Even with nearly one-half the fires hand fought, the results obtained by equipment on the other half of the fires in Region 8 have been so great as to cut the national forest burned area in that region per fire to around 25% of their former average size. The figures in column 15 of chart 20 depicting results in other regions fluctuate with hard and easy seasons, but still they show no downward trend.

Because of local conditions frequency of extra period fires is not comparable nationally. Within Region 8 something has happened to eliminate proportionately around 75% of the fires which used to carry into the second burning period. Region 8's studies show that change is largely a product of power equipment effectiveness.

USE OF LINE BUILDING EQUIPMENT

C. Y. 1951

REGIONS	1	2	3	4	5	6	7	8	9	1-9
Number Fires Class B & Larger	188	113	512	152	595	242	131	2,376	551	4,760
Number Fires Bulldozer Used	27	8	38	25	171	61	-	1	6	337
Number Fires Tractor-PlowsUsed	-	1	-	1	-	9	-	1,556	49	1,616
Number Fires Equipment Used	27	9	38	26	171	70	-	1,557	55	1,953
Percent B plus Fires Equipment Built	14.4	7.9	7.4	17.1	28.7	28.9	-	65.6	10.0	41.0
Chains Fire Line Equipment Built	907	736	10,411	2,161	21,139	7,279	-	69,625	2,164	93,283

C. Y. 1952

Number Fires Class B & Larger	232	193	461	182	450	328	313	2,535	1142	5,836
Number Fires Bulldozer Used	35	23	4	8	94	77	-	21	22	284
Number Fires Tractor-Plows Used	1	5	10	-	-	12	-	1,266	180	1,474
Number Fires Equipment Used	36	28	14	8	94	89	-	1,287	202	1,758
Percent B plus Fires Equipment Used	15.5	14.5	3.0	4.4	20.9	27.1	-	50.8	17.7	30.1
Chains Fire Line Equipment Built	1,744	1,792	234	366	4,422	3,764	-	46,247	7,025	65,594

CHART 18

PRINCIPAL TRACTOR PLOWS - R-8
AVERAGE PRODUCTION FACTORS

TYPE EQUIPMENT	TIMBER TYPE	AVG. WIDTH LINE INCHES	CHAINS CONSTD. PER HOUR	LBS. DRAW BAR PULL
HG 42 CLETRAC RANGER PAL PLOW	Long Leaf Ridge	92.3	171.0	880
	Loblolly Hardwoods Light Understory	80.0	170.0	1231
HG 42 CLETRAC ANDERSON 2 DISC PLOW	Long Leaf Ridge	62.3	213.9	997
	Loblolly Hardwood	45.0	191.3	1383
TD 6 SUPER PAL PLOW	Long Leaf Semi-Dense	84.2	116.3	1895
TD 9 MATHIS PLOW (Hand Lift)	Long Leaf Dense Understory	82.0	167.7	2117
	Loblolly Hardwood Dense	86.0	134.8	3171
MATHIS PLOW (Hydraulic Lift)	Long Leaf Dense Understory	84.0	148.8	2650
HG 42 CLETRAC TALLADEGA PLOW	Appalachian Hdwds.	41.0	97.1	1263
	Mountain Short Leaf Hardwoods	47.0	86.4	1220

SATISFACTORY LINE — CAN BE BACK FIRED FROM ON HIGH CLASS 4 FIRE DAY

MAXIMUM GRADES PLOWED AND MEASURED IN MOUNTAINS

Plowing Up-slope ..... 40 % Grade
Plowing Down-slope ..... 67 % Grade
Plowing Side-slope ..... 49 % Grade

CHART 19

EFFECT FIRE LINE EQUIPMENT

F.Y.	F F F SUPPRESSION EXPENDITURES					BURNED AREA SIZE OF FIRES R 8							ALL OTHER REGIONS			
	SERVICE WIDE	REGION 8			PERCENT SERVICE WIDE FFF FOR SUPPRESSION-R8	NUMBER FIRES B & LARGER	ACRES BURNED N F	BURNED PER B+ FIRE	TOTAL ACRES BURNED INSIDE	BURNED INSIDE PER B + FIRE	EXTRA PERIOD FIRES	PERCENT FIRES COLUMN 6 CLASS C OR LARGER	ACRES BURNED INSIDE	NUMBER FIRES CLASS B & LARGER C.Y.	ACRES BURNED INSIDE PER CLASS B PLUS	EXTRA PERIOD FIRES
		E OR & R	OTHER	TOTAL												
	(Col-1)	(Col-2)	(Col-3)	(Col-4)	(Col-5)	(Col-6)	(Col-7)	(Col-8)	(Col-9)	(Col-10)	(Col-11)	(Col-12)	(Col-13)	(Col-14)	(Col-15)	(Col-16)
1945	$ 1,787,311	$32,340	$132,317	$164,657	9.27	2,193	47,740	21.77	79,033	36.04	11	45.7	191,375	2,505	76.39	126
1946	3,516,204	55,647	148,668	204,315	5.81	2,437	33,687	13.82	51,642	21.19	—	39.8	236,225	3,548	66.58	187
1947	3,770,692	68,880	153,053	221,923	5.88	2,911	44,487	15.28	70,655	24.27	8	38.2	92,685	4,977	18.62	102
1948	4,895,614	63,845	135,315	199,160	4.07	2,158	25,467	11.80	40,764	18.89	6	32.9	161,056	2,239	71.93	112
1949	3,247,364	54,008	131,764	185,772	5.72	1,754	14,861	8.47	27,746	15.82	6	32.7	161,733	3,089	52.36	75
1950	7,420,645	88,258	193,159	281,417	3.79	2.174	28,408	13.06	48,038	22.09	4	34.9	198,916	2,641	75.32	142
1951	6,474,180	83,852	125,466	209,318	3.23	2,485	29,748	11.97	46,534	18.72	8	29.6	372,750	2,358	158.08	120
1952	8,515,763	68,470	128.315	194,785	2.29	1,993	20,544	10.30	33,246	16.68	4	26.9	272,425	3,872	70.36	99
	PRE-MECHANIZATION R-8			F.Y.												
	130 CCC CAMPS			1941		2,542	86,349	33.97	100,034	39.35	9	45.0				
	75 CCC CAMPS			1942		2,455	118,935	48.47	190,845	77.74	20	47.2				
				1943		3,234	154,828	47.87	226,045	69.90	36	47.4				

CHART 20

Region 8 estimates that without its power fire line construction equipment, its suppression cost would be between 2 and 3 times the present actual cost. In other words, Region 8 men believe they are pretty close to recapturing the amount of their equipment investment every year in reduced suppression cost.

They also believe that if they did not fight a vast majority of their fires with power fire line equipment they would be burning an additional 60,000 acres per year.

Region 8 further states in its analysis that a further benefit from the use of fire line construction equipment is the greatly reduced amount of time rangers and project men now have to divert to suppression and the reduced disruption of the other activities on districts and forests so equipped that a few men can handle most fires with confidence and dispatch.

c. Summary.

Since 1944 Forest Service owned equipment available for fire suppression has increased as follows:

Bulldozers from 161 to 200.
Tractor plows from 96 to 194.
Tank trucks from 233 to 547.
Aircraft from 1 to 17.
Portable pumpers from 654 to 778.
Power saws from 32 to 534.
Radios from 2703 to 6309.

A corresponding increase in many similar classes of equipment is available from cooperators.

There has been a marked increase in the use of equipment on suppression. For example during 1952 line building equipment was used on 1953 out of a total of 4760 fires B and larger in size. Tank trucks were used on 2189 fires and were the primary means of control on about 800 fires. Smokejumpers jumped to 267 fires.

These statistics illustrate very pointedly that fire control is changing to a mechanical operation which is requiring a change in the methods of operations and is calling for new systems of fire management and new techniques in fire suppression.

3. Roads, trails, airfields and improvements.

a. The Analysis.

Accessibility has an important bearing on initial and follow-up action on fires. A comparison of miles of trails, roads and airfields in 1933 with 1952 was made to provide a picture on changes in accessibility during the past 20 years.

Numbers and kinds of improvements in 1933, and 1952, were also compared.

b. Analysis Digest.

Chart 21 shows the extent to which roads and trails have increased the accessibility of national forests for fire control purposes since 1933.

Chart 22 provides information on the growth in miles of roads and trails maintained by the Forest Service; the mileage of roads maintained by others, and an estimate of the ultimate mileage of roads and trails in the national forest transportation system.

Table 1 is a tabulation of inventory changes in Fire Control improvements for all regions and for Regions 1, 2, 3 and 5 and four region summary.

c. Summary.

Most national forests are much more accessible now than formerly which has partially offset (1) the reduction in protection strength, (2) increased hazard, and (3) risk.

Communication facilities particularly in the electronic field have increased appreciably and as communication with this new media has increased there has been a corresponding decrease in miles of telephone lines.

Numbers of lookout structures have decreased as a result, particularly in Region 1, of the increased use of aircraft for detection.

Landing fields have increased.

Condition of numerous fire control improvements in 1953 is below standards. Large sums of money are needed to meet maintenance requirements.

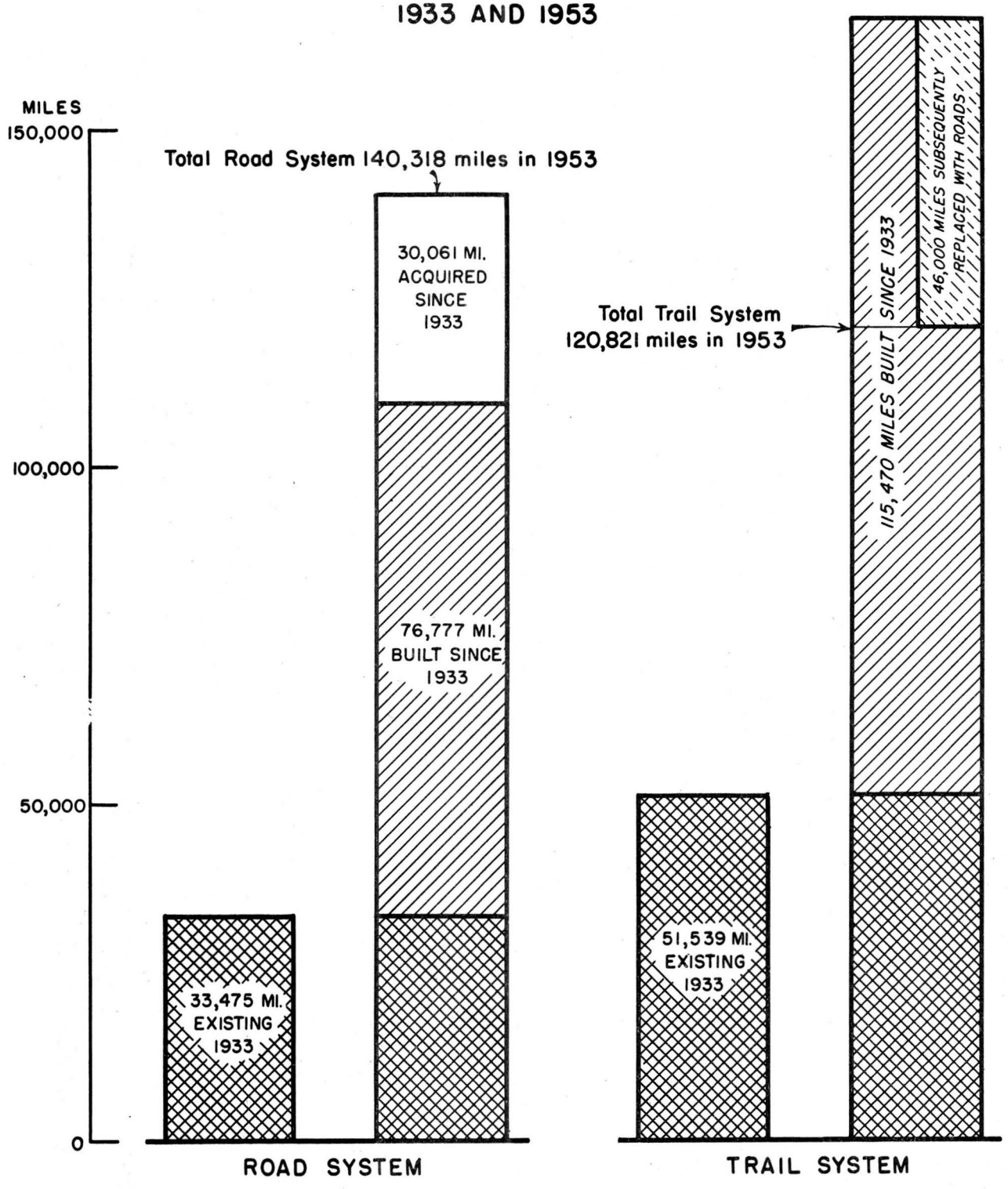
Table 1

INVENTORY CHANGES IN NATIONAL FOREST FIRE CONTROL IMPROVEMENTS
1933 TO 1953

FOR ALL NATIONAL FORESTS COMBINED, FOR REGIONS 1,2,3 AND 5 SEPARATELY, AND FOR 4 REGIONS COMBINED

ITEM		ALL NAT. FOR.		REGION 1		REGION 2		REGION 3		REGION 5		TOTALS (4 regions)	
		1933	1953	1933	1953	1933	1953	1933	1953	1933	1953	1933	1953
ROADS	MILES	49,147		4,147		2,366		7,277		13,411		27,201	
			125,000		11,765		8,020		15,379		24,525		59,689
TRAILS	MILES	113,219		35,816		15,306		5,883		20,169		77,174	
			120,821		29,021		11,966		7,355		16,004		64,346
LANDING FIELDS	NUMBER			2		0		0		8		10	
			112		24		0		18		16		58
TELEPHONE LINES	MILES			14,300		2,786		3,354		7,000		27,440	
					10,227		1,080		4,015		4,300		19,622
RADIOS	NUMBER			59		0		5		0		64	
			7,633		1,031		150		525		600		2,306
RADIO COVERAGE	SQ. MI.			451		0		200		0		651	
					20,126		14,000		35,000		25,537		94,663
LOOKOUTS	NUMBER			840		3		90		114		1,047	
			2,083		284		20		98		297		699
LOOKOUT DETECTION COVERAGE	SQ. MI.			21,501		300		16,000		10,166		47,967	
					15,136		2,700		18,750		18,000		54,586
FIRE CREW STATIONS (Including those at N.F. & D.R. Hdqtrs.)	NUMBER			200		35		73		241		549	
					229		100		85		314		728

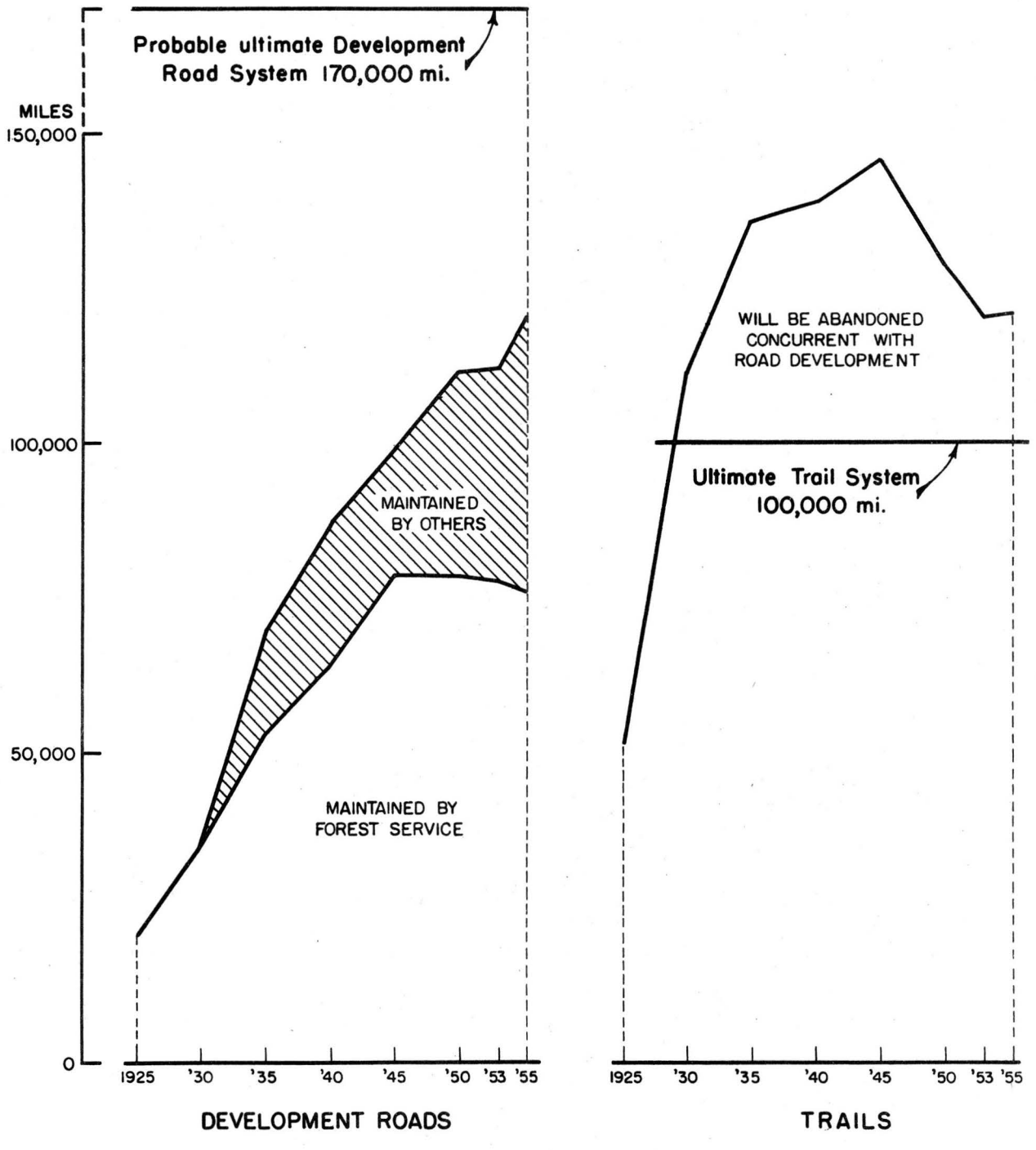
IMPROVED ACCESSIBILITY ON NATIONAL FORESTS
ROAD AND TRAIL SYSTEMS
1933 AND 1953



ROAD INVENTORIES BY REGIONS ASSIGN PROTECTION VALUE TO 89% OF SYSTEM
TOTAL ROAD MILEAGE INCLUDES FOREST HIGHWAYS

CHART 21

NATIONAL FOREST DEVELOPMENT ROADS AND TRAILS
GROWTH IN EXISTING MILEAGE
1925 TO 1955 (est.)



ROAD INVENTORIES BY REGIONS ASSIGN PROTECTION VALUE TO 89% OF SYSTEM

CHART 22

C. Trends in Suppression Action.

1. The initial action phase.

a. The Analysis.

A study of 4,263 fires in Regions 1 and 5 was made. Data were analyzed as to types of detection, speed of discovery, reporting time, elapsed time from report to arrival of first attack forces, strength of first attack, elapsed time for first reinforcements, and strength of first reinforcements.

b. Analysis Digest.

The study of initial action reveals evidence that there has been a general let-down during the past 10 to 15 years in all phases of the initial action job in the two regions for which the study was made. The improvements made in training, and fire fighting techniques have been more than offset by declines in other factors.

Region 1's planned detection force detected 21% fewer critical fires than during the early 1940's. Most of this difference was due to decrease in the number of manned lookouts. Discovery time averages were consistently slower. Aerial detection is partially responsible. A study of report time shows 14% fewer fires being reported within 10 minutes. Elapsed time for first attack is likewise slower, at least in some areas. The strength of first attack has been reduced in some areas due partly to reduction in initial suppression forces. There has been a general slow-up both in speed and strength of attack for first reinforcements.

Indications are that our initial action forces are unprepared to cope with a critical fire season. The dangers inherent in the losses of efficiency are serious enough to justify our devoting special effort and attention to the task of improving the planning and organization of initial action forces.

c. Summary.

Data indicate very strongly (1) a smaller percentage of fires are discovered by lookouts than in the period 1940-43, (2) report time for critical fires is slower, (3) the arrival of first reinforcements is slower now than in 1940-43 for the critical fire, (4) the initial attack today, generally appears to be more sluggish than formerly.

Note: Although this analysis dealt with Regions 1 and 5 similar conclusions apply to most regions.

2. The project fire phase

a. The Analysis.

Six separate items were considered in making the analyses. What devices now being used were not used prior to 1950? What has been the increase in modern devices since 1950? What is the intensity of "off the line" suppression effort? What is the 1953 situation with regard to interregional overhead on project fires? Is it increasing or decreasing? Is special consideration being given to the resource manager in relation to project fires? What are the major problems or weaknesses in handling project fires?

b. Analysis Digest.

The regions are taking advantage of new and modern devices within the scope of available funds. They are also attempting to intensify off-the-line suppression efforts. They are answering the call for overhead from other regions as best they can.

Appropriations for the field of fire control fall far short of what is needed.

Lack of funds has resulted in "shot-gunning" funds through the entire field of fire control. This approach is probably the only one that can be made under the circumstances. A second look should be taken of the financial pattern that comes as a result of this method. We need to make sure that we are getting the best financial pattern in fire control. This is not only important from forest to forest but from region to region also.

Under somewhat comparable situations we find there is a big problem in getting comparable results. Some get more for their dollar than others. This is, in part, a human factor that shows results with a careful program of selection, training and providing for experience.

Another point -the use of the best man to take charge of a fire is advocated.

In some cases there is considerable doubt as to who is the best man. How many times has this resulted in uncalled for expense and damage? Perhaps we need to spend more time

training to select qualified project fire men. We cannot afford to gamble with men of questionable ability to take charge of project fires. Perhaps we should consider project fires as those which should be handled by trained project fire teams of known ability. The average ranger would agree to a project fire team. At present there is a reluctance to relieve the ranger of the responsibility of handling project fires because of the hard feelings that may result from placing another person, often of equal rank, in charge of the fire.

There is no substitute for training and experience. Position does not automatically bestow on any individual ability or experience. If we could train the men who fight the fires in the basic things already known, we would get better results. Further research will not pay in full unless it can be integrated into a sound pattern of training.

Closely related to the other points is the need to standardize approaches, methods and procedures. This need becomes more critical as interregional details of men becomes more pronounced, which is the direction we are moving - particularly in the west.

Fighting a forest fire has been likened to fighting a war. Wars are not won by armies of individual thinkers who take individual action. Standard methods with trained, well organized and equipped men who are guided by trained, selected, and experienced staff officers win the battles. The same applies right on down to minor skirmishes.

The present program in fire control of individual freedom is expensive and further complicates thinking and the establishing of fire organizations that have any teamwork.

c. Summary.

Great forward strides have been made in mobilizing, equipping, feeding and caring for large numbers of fire fighters employed on project fires. Considerable improvement has been made in the use of power equipment in the control of fires. Aerial reconnaissance on project fires has been improving - use of the helicopter has helped bring this about. The "behind - the - lines" fire organization has shown improvement. Strategy and tactics have improved.

Overall, the project fire phase of the management job has improved but there is a large field needing further attention. Production per unit of manpower or machine in the mountainous

areas of the west is altogether too low. A great deal more attention must be directed towards improving speed of line construction. Line holding is another field that will require considerable attention. Too many miles of fire line are lost each year. One big job ahead, and probably the most important in the project phase of suppression operations is to speed up line construction per unit of man power or machine and to effectively hold the line once it is constructed.

3. Effectiveness of suppression action as determined by a study of the average size of man-caused and lightning fires, number or percent of Class A and B and Class C, D and E fires, and number or percent of extra period fires.

a. The Analysis.

The Analysis compared data by regions for the period 1940-42 with the period 1950-52. It consisted of a study of (A) numbers of man-caused and lightning fires, (B) total acres burned by man-caused and lightning fires, (C) average sizes of man-caused and lightning fires, (D) average size of man-caused and lightning Class E fires, (E) percent of man-caused and lightning Class C, D and E fires, (F) number and percent of man-caused and lightning extra period Class C, D and E fires, and (G) number of fires and area burned by size classes.

b. Analysis Digest.

Summaries of items (A) through (F) of the foregoing in terms of increases (↗) or decreases (-) for the period 1950-52 as compared to 1940-42 is shown below:

Summary of Items A-F in terms of Increases (↗) or decreases (-) For the Period 1950-52 as Compared to 1940-42.

	A		B		C		D		E		F	
Region	MC	L	MC	L	MC	L	MC	L	MC	L	MC	L
1	-	-	-	-	-	-	-	-	-	-	-	-
2	↗	NC	↗	NC	↗	NC	↗	NC	↗	↗	↗	↗
3	↗	-	↗	↗	↗	↗	↗	↗	↗	↗	↗	↗
4	-	-	-	-	-	-	-	-	-	-	-	-
5	-	↗	-	↗	↗	-	↗	-	-	↗	↗	↗
6	↗	-	↗	-	↗	-	↗	-	↗	-	↗	↗
7	-	↗	-	NC	↗	-	-	NC	-	↗	↗	↗
8	↗	↗	-	-	-	-	-	-	-	↗	-	NC
9	-	-	-	NC	-	↗	↗	NC	-	↗	-	NC

NC - No significant change. MC - Man-caused fires. L - Lightning caused fires.

Chart 23 provides information on item G of the Analysis.

NUMBER OF FIRES AND AREA BURNED ON NATIONAL FORESTS BY SIZE CLASSES FOR PERIODS 1940-42 & 1950-52

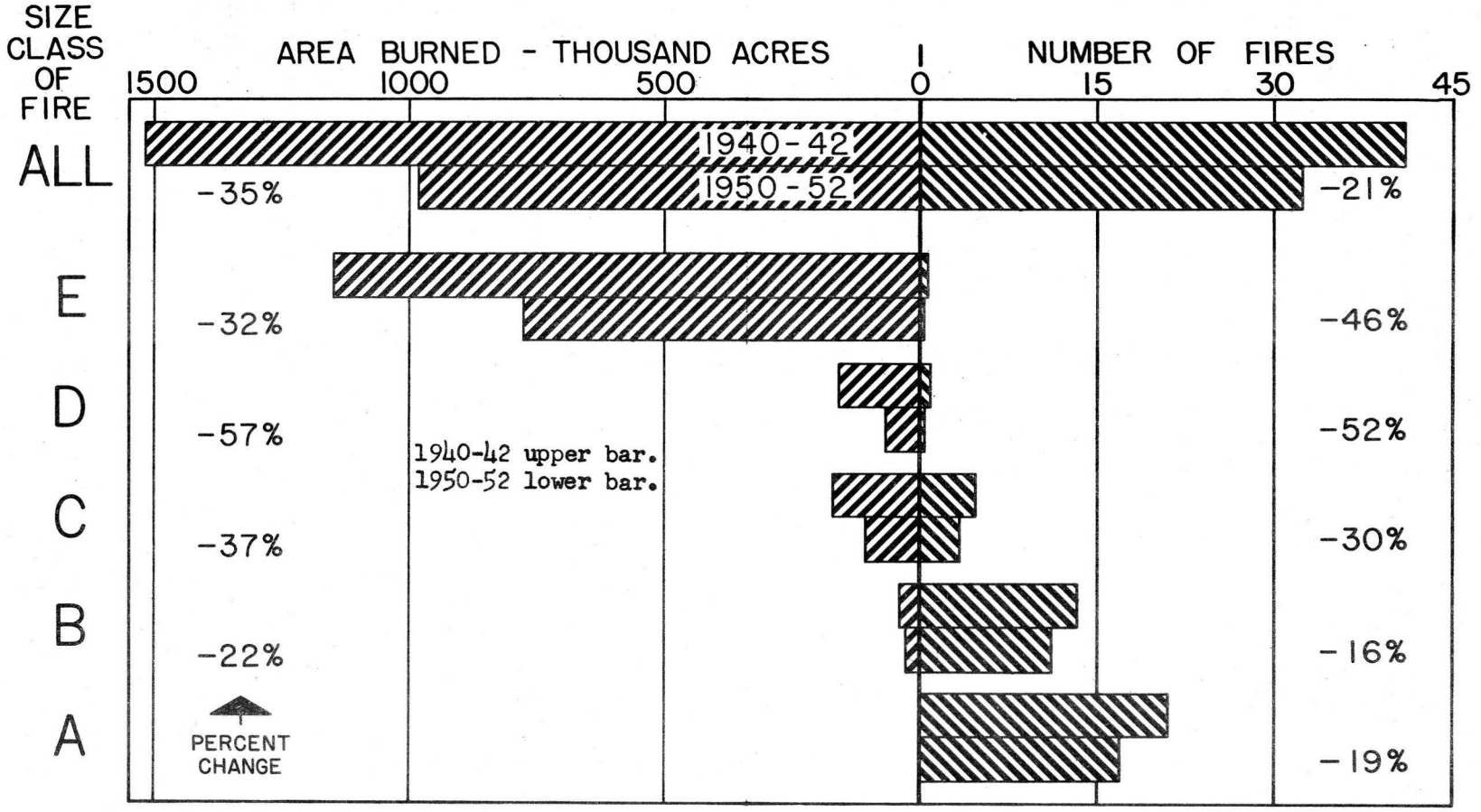


CHART 23

c. Summary.

Data show significant changes in some of the measures describing the fire business which took place between the periods. Changes occurring in some regions did not occur in others. Data show the result of protection by periods and regions but gives no clues as to what brought the result about.

Specifically overall averages for all regions and all fires show a decrease in area burned and a decrease in numbers of fires for the period 1950-52 as compared to 1940-42. This is true also for all classes of fires - A - B - C - D - E.

The table (page 55) shows a decrease in all items in Regions 1 and 4. Regions 2, 3, 5 and 6 show the largest percentage of increases. Region 3 shows all increases except in one case.

D. Conclusions.

1. Looking at resource losses purely from the statistical standpoint, there has been a significant increased loss in the period since 1949 as compared with the period 1940 to 1949. Service-wide statistics for national forest ownership show this trend for volume of commercial timber lost, area of young growth burned, and area burned of both commercial forest land and non-commercial land. The upward trend is particularly marked in Regions 3, 5, and 6, while Region 4 has shown a marked decrease in these items. When resource losses are expressed in dollar damage, the trend in loss is even more significant.

2. Fire protection is almost universally adequate during easy fire weather. During average fire weather, protection is adequate only in the easy and moderate fuel types. On most national forests protection is not adequate during periods of critical fire weather.

3. Stock taking primarily consisted of comparing the present fire control situation with that existing in the early forties. During this period, in the west especially, there has been a shifting in activity on the national forest from custodianship with heavy emphasis on protection to the problems inherent in the demand for increased resource uses. This has had an effect upon fire control management. The area of dangerous fuels has increased.

   Although statistics available and experienced judgment of fire control leaders cannot establish exactly the situation in fire control today as compared to former years, they do indicate trends and conditions as follows:

   a. There has been a general increase in the value and importance of national forest resources accompanied by more intensive use by more people. This not only complicates the fire protection job but also creates the need for more intensive fire control.

   b. Although there is a need for better fire control, the increased resource activities and the greater emphasis placed on resource management, together with other non-fire activities, have detracted from our fire control efforts. Forest officials with greater work loads and job complications devote less time, attention, and interest to fire control management. There has been a marked letdown in the fundamentals of good fire control management, particularly in the initial action phases of suppression.

c. There has been a decrease in manpower available for detection, smokechasing, and crew suppression action, i.e., scarcity of woodsmen and skilled workers, experienced rangers.

d. In general, fire plans are inadequate due either to obsolescence or to lack of development.

e. There has been a general increase in the difficulty of fire control created by physical factors. More intensive resource use has increased the overall badness of fire fuels and the risk of man-caused fires. Fire control improvements such as lookout structures, telephone lines, trails, and in some cases roads, have deteriorated.

The following elements partially compensate for, but do not offset, the above:

a. There has been a substantial increase in the quantity of specialized equipment such as bulldozers, power-driven plows, tankers, power saws, radios, aircraft, etc. Great progress has been made in developing skills and techniques of using such equipment.

b. There has been an increase in the number of organized cooperative crews.

c. Improvements in service of supply have been noticeable. Better transportation systems, improved automotive equipment, hot meal delivery, aerial supply and other new techniques have helped to increase efficiency.

d. Progress in the use of smokejumpers has contributed much, particularly in the back country.

e. Advancement in aerial detection has helped. This activity has reached a stage where rapid progress is possible, provided adequate attention can be devoted to the task.

4. In Summary: It is the considered opinion of Fire Control officials, based upon careful analysis of material presented, that the ability of the Forest Service in fire control is falling behind the advances required by land use management. The trend cannot be viewed with optimism and warrants a most serious consideration at the policy making level of the Forest Service.

E. Recommendations.

1. Accurate measurement of the efficiency and effectiveness of Fire Control Management is not possible since full effects of changes in weather, risk, hazards and similar elements on fire statistics are not known.

   It is recommended that a system or systems be developed that will permit better evaluation of the effects of these elements on fire statistics.

   W. O. Comment - This recommendation is approved for further attention by Research. Some work has already been done by the SE Station and the NW Station. For the present, local agreement on what is needed will enable use of the best we now know in setting up such criteria for regional use.

2. The current Form 929 does not permit identification of fire statistics by resource management units. Full information on resource losses, numbers and causes of fires by management units are essential to the preparation of fire and resource management plans. A system should be devised which will permit identification of fire statistics by management units much in the same manner as such statistics are now possible of identification for each national forest.

   W. O. Comment - Recommendation approved and assigned to Washington Division of Fire Control for action.

RELATION OF FIRE MANAGEMENT TO OTHER RESOURCE MANAGEMENT WORK

A. Integration and Correlation of Fire Control with other Resource Management Work.

Special use tracts and resort areas are in many cases located in the center of highly hazardous areas. Hunting seasons in many areas are in the heart of the fire season. Wilderness areas involving complex fire problems are proving difficult to protect. There is the question of brush burning for improvement of forage. There is the question of hazardous areas following logging without a compensating increase in protection. Contracts, easements, permits and other instruments allowing for the use of national forests have varying fire control impacts. Erosion may follow removal of hazards by fire.

How can the integration and correlation of fire and resource management be made more effective in order to reduce the impact of resource management activities on problems of protection from fire?

Are resource and fire managers in tone with each other? Contrast fire thinking and the high priority given fire activities when the over-all Forest Service jobs and viewpoints were heavily custodial to the present situation when resource management has reached a commanding significance which will continue to increase. Consider fire management's real place in resource management.

1. Silvicultural relationships.

   a. The Analysis.

      Are cutting methods, slash disposal methods and protection from fire correlated? Will cutting methods and use or non-use of fire lead to more brush fields or non-restocked areas? Are cutting practices resulting in excessively large unbroken areas of reproduction which do or will present a needlessly large and risky protection problem? Are cutting methods leaving an impossible mass of fuel? Is continuous effective and economical fire protection insured by timber harvesting or does it create a risky, costly job? Is fire or can fire be used as a silvicultural tool?

   b. Analysis Digest.

      Silviculture is defined as the science of growing, reproducing and harvesting stands of timber on a continuous basis. The control of fire is essential if timber crops are to be produced in a controlled and orderly manner.

This nation has gone through several steps in its history before accepting the present position that growing trees is an agricultural function. These steps were economic in nature. The early pioneers were faced with the necessity of clearing the forests to obtain land for crops and grass in order to survive in the new world. The demands for lumber in the new nation led to early day logging of the "unlimited" supply of timber. There was little thought given to growing a new crop. Fire concerned them only when it threatened their operations or developments. This was the trend in the forested areas from the east coast to the west coast.

During the period of about 1880 to 1900 a few far-sighted men visualized the future growth of our country and could see the need and value of our timbered areas. They could see the necessity of stopping their destruction by wildfire. The importing of a few European-trained foresters and the return of a few men trained in Europe led great emphasis to the need for recognizing trees as a crop. Tremendous emphasis was also given to the entire forestry problem during the early part of the century when millions of acres of public domain lands were placed in Forest Reserves.

The ever increasing demand for forest products in our growing nation in conjunction with the rapid strides, in the last 30 years, to extend adequate fire protection to all our forested areas, is well known by all of us. These facts have made it economically possible to practice silviculture in nearly all of our forested areas.

(1) Silviculture.

Changes in the composition or density of a timber stand influence the many factors associated with it. It influences the soil, water, vegetation, wildlife, microbiology, microclimate and associated factors.

The manipulation of the stand through various silvicultural methods influences these factors in varying degrees. It is within the professional field of the forester to practice the form of silviculture that best fits his needs, economically as well as with the future of the new crop in mind.

(2) Microclimate.

Microclimate is greatly influenced by silvicultural systems. Closed stands may be changed to varying degrees of open stands by cuttings. Opening of the crown cover results in higher surface temperatures and greater wind velocities.

This, in turn, results in more rapid drying out of surface material and lower fuel moisture during the fire season. It also permits drying out earlier in the spring and late in the fall, thereby extending the fire season.

Studies in closed stands as compared with open stands after logging have shown some striking contrasts. Charles Buck of the California Forest & Range Experiment Station has made measurements during the last few years that give us a definite picture of what can be expected. Conversion of closed stands to open stands has shown the following ratios:

Fuel temperature	1 to 1.5
Fuel moisture	1 to 0.5
Surface wind velocity	1 to 10

This means that the surface temperature at a given time in a closed stand might be 80 degrees while in an open stand at the same time it would be 1½ times that or 120 degrees. At the same time the fuel moisture in the closed stand might be 8% while it would be 4% in the open stand. Add to these the wind factor of 10 and you have an entire new weather condition to contend with.

Fire danger rating is changed almost immediately after logging. A rating of medium may now be very high or extreme. The probability of fire starting and the rate of spread potential is greatly increased.

The crown canopy is the important factor in establishing these ratios. The silvicultural system can control this crown canopy.

(3) The Vegetation (Fuel)

Fuels in the stand are the dead and green materials. The silvicultural practices can determine the kinds, amount and distribution of these fuels.

Logging removes varying amounts of fuel from the area entirely. At the same time it accumulates a great deal of slash and knocks down other material. This puts a lot of the canopy down on the ground where it becomes a real fire hazard. The arrangement and condition of fuels result in an entirely new problem. The area is almost immediately changed, from perhaps a low hazard area to one of high hazard.

These high-hazard fuels on the ground also usually offer higher resistance to control because of their susceptibility to spot fires and the difficulty of line construction.

(4) Microclimate and Vegetation

The increased fire hazard combined with the increased fire danger ratings gives us a greatly stepped-up fire control problem. Both items are important. However, the change in microclimate perhaps should receive more emphasis in our fire control planning for these areas than it has in the past.

There is little we can do about the microclimate after the silvicultural practice has been accomplished. We must live with the change until vegetation reaches the point that the crown canopy again closes in. The microclimate will gradually become less severe as this occurs.

We have been very much concerned about the slash and other material after logging, and we have done and are doing a lot about them. The early practices of silviculture called for 100% piling and burning - especially in timber sales areas in the west. Piling and burning were fire hazard-reduction measures, which removed the flash fuels but not the heavier materials, and actually removed only a small percentage of the total fuel.

The Second World War, with the resultant labor shortage and increased wages, required us to take a new look at the slash disposal practice on the national forests. Studies in California and other regions resulted in a modified slash-disposal policy in the pine areas of the west - that of piling and burning along roads, strategic areas of use and along ridges, etc., then lopping or not lopping the tops over the rest of the area. More emphasis was placed on prevention of fires and initial attack for the first few years after cutting.

Similar trends took place in other regions. This resulted in a modified slash-disposal policy in most all the selectively cut silvicultural systems.

(5) Fire as a Silvicultural Tool

Studies in recent years have shown that many of our tree species and timber types owe their existence not only to climate and soil but to fire as well. They are sub-climax in the strict sense of the term. We must recognize, however, that they are climax under the condition in which they developed and existed. Some of these major types are the Douglas-fir of the Northwest, the mixed pine-fir types of the West, the southern pines and the jack pine of the Lake States, to name a few.

This has led to the use of fire as a tool of silviculture as well as a tool for hazard reduction in some areas. It has also led to experiments with the use of fire for both purposes in many other areas.

c. Summary

(1) Silvicultural systems have a varying but positive effect on the fire control load due to changes in microclimate and the vegetation itself.

(2) Silvicultural systems, including stand improvement, have, in general, been developed by timber managers with the objective of producing maximum growth of timber. The need for fire protection was, for the most part, not a direct consideration in their development. For the most part, the fire protection measures, required to assure permanent production, have developed as a result of the silvicultural systems, and not as part of them.

(3) The effects of cutting on the fire load are more pronounced in the coniferous types than in the hardwoods under the silvicultural systems now in use.

(4) In general, it can be said that in all silvicultural methods of selective cutting in coniferous types, slash is piled and burned along roads and strategic areas as a fire hazard-reduction measure. In nearly all of these systems the snags are felled and all tops are lopped. Clear cutting in coniferous stands is nearly always followed by some piling and burning or by broadcast burning as a hazard-reduction measure.

(5) All regions except 5 and 6 have indicated they are keeping up with the fire load that results from the silvicultural systems now being practiced. Region 6 reports they are unable to entirely keep up on clear-cut areas that are broadcast burned because cooperative funds are not then available for additional fire protection. Region 5 studies show they are not now entirely on top of the fire job in the rapidly expanding cutover areas in the Sierras.

(6) The increasing fire problems are in the large areas of more or less inaccessible mature and over-mature stands in their heavy growth of young trees and shrubs which have resulted from fire protection itself. These offer a much bigger fire control problem at the present time than do the cutover areas. This is the case now, and it is calculated that it will remain the biggest problem in the immediate future.

(7) It is the general opinion that subsequent growth and development of our cutover areas will offer a lesser fire problem than do the virgin inaccessible timber stands we now have.

(8) Many of the timber types throughout the country are now recognized as owing their existence to uncontrolled fires in the past. Fire as a silvicultural tool is now recognized and used in some types, and experiments in its controlled use are under way in many other types.

2. Treatment of fuels.

a. The Analysis.

The use of fire, mechanical methods and utilization to treat fuels including slash so forest areas will be relatively risk free was considered. Consideration of these factors is especially important while we are progressing from virgin forests through extensive management to intensive management. What can we do to treat or use fuels, probably with high initial cost, but in such a way as to lower annual costs and materially reduce large burned acreage? What are practical limits of cost in this connection?

Prescribed burning is being practiced extensively in Region 8 and to a lesser degree for varied purposes elsewhere. What is the future of prescribed burning from a fuel reduction viewpoint (1) in clear cut Douglas fir areas, (2) on reproducing pine lands, (3) following logging selectively in pine and mixed conifer stands, (4) in virgin timber stands, etc.?

b. Analysis Digest and Summary.

Reduction of high hazard fuels is generally accepted as a necessary step to adequately protect forests from fire.

Snags are rated as a high hazard fuel in Regions 1, 3, 5, 6, 7, and 8. Regions 1 and 6 have great areas of dense stands of fire-killed snags and Region 8 has great areas of scattered snags killed by girdling or poisoning defective and nonmerchantable trees.

Blowdown in dense coniferous stands creates an extreme hazard.

Forest litter of the hardwood types in Regions 7, 8, and 9 is highly inflammable in the spring and fall. The greatest hazard from forest floor, grass, and undergrowth fuels is in the coastal plains pine areas of Region 8. Such fuels in the ponderosa pine belt of the west are, for the most

part, moderately hazardous, but in some localities rate of spread is high to extreme owing to flashy undergrowth or more than the normal amount of grass. Other coniferous types usually have a low hazard under the crown canopy. After crown removal, weeds and undergrowth cause a high hazard in the western part of Region 6.

Brushfields in Region 5 and the southern part of Region 6 are an extreme hazard.

Dense coniferous sapling stands are a high hazard.

Slash from hardwood cutting and from light-selection cutting in conifers does not significantly increase the hazard. Slash from the prevailing selection cutting in the ponderosa pine belt sufficiently increases the hazard to justify a reduction investment. Clear cutting in dense stands of conifers creates a high to extreme hazard.

Mechanical methods are now being widely employed in the reduction of forest fuels. Methods now employed to limited extent are use of chippers, throwing material into cat roads and cutting into pieces by discing.

Lopping and scattering of slash in selectively cut stands appear to be less used as a means of disposal than it once was.

A growing tendency to leave more slash in selectively cut stands to deteriorate by natural means is indicated. Additional protection during the period of deterioration is considered essential.

Improved utilization is perhaps the soundest longtime approach to the problems of treatment of fuels in the forest for hazard reduction. Economics will largely govern our progress in the field of utilization, but continuing effort is needed on our part to improve it wherever possible.

Chemical control is not yet developed to the point of wide use in treatment of fuels for hazard reduction.

Piling and burning continue to be a preferred method of treating slash in selectively cut stands of ponderosa pine and other coniferous stands. A tendency to use this means to reduce large areas to smaller blocks and with added protection to wait for natural deterioration seems evident. The use of machines for piling has reduced costs of this method where applicable. Covering of piles with paper has lengthened the burning season and reduced damage from burning.

Concentration burning is used to a limited degree. It poses threats to adjacent values which must be carefully guarded against if it is used.

Broadcast burning of heavy slash fuels has wide application in the heavy slash areas of the west coast and northern Idaho. Its use elsewhere is very limited. It is a touchy method to use and demands careful preparation and follow-up. Results of the practice continue to be controversial, and additional facts are needed to properly evaluate the results of such burning on soil, water, and vegetation.

Broadcast burning (prescribed burning) is used for hazard removal in blowdowns, concentrations of felled snags in old burns, removal of brush, and natural accumulations of fuels on the forest floor. The practice is quite well established in the south but is largely in the experimental stage in other areas.

3. Water management.

a. The Analysis.

Quoting from one Regional Forester; "It's time we begin to really do something about manipulation of cover in our western mountains in relation to water management. In two-thirds of the forest zones it can be done through timber management. Is fire the right tool to use elsewhere? What about brush fields? Is fire the right tool?

Also related is the use of fire to rid range lands of noxious plants, invaders and water wasters. The question boils down to one of trying to keep the land fire-free consistent with the accomplishment of watershed objectives. Can research and experience be pooled and where do we go from here?"

b. Analysis Digest and Summary.

Effective fire control can keep the amount, rate, and quality of stream-flow within normal limits and thus neither aggravate nor ameliorate downstream water problems. Conversely, inadequate

fire control can bring about floods up to 100 times the normal, and can accelerate erosion and step up the sediment load of streams as much as 1,000 fold or more.

The hazard and damage of fire-induced floods and erosion varies from place to place, but tends to increase with:

(1) Number and intensity of torrential rains.
(2) Slowness of natural revegetation.
(3) Steepness and length of slope.
(4) Susceptibility of the watershed mantle to erode and to lose its capacity to infiltrate and to store water.
(5) The downstream and on-site values that are subject to damage.

Sound planning for the control of hot fires and for the practice of prescribed burning is handicapped by several obstacles as follows:

(a) Quantitative information about the hydrologic consequences of fire is meager or non-existent for all but a few watershed situations.

(b) No simple and practical guide has been developed to date for appraising fire-induced water damages and benefits.

(c) There is need for more positive integration and correlation of fire control with other resource management objectives and requirements.

(d) There are inadequate provisions for promptly restoring satisfactory watershed conditions following hot burns.

(e) Stronger and hydrologically sound, watershed management objectives are needed in all resource management plans.

4. Inaccessible areas - wilderness, wild and primitive areas.

a. The Analysis.

Fire Control has not been solved in these roadless areas. The job is costly. Do we need to consider other things than men, trails, airplane, smokejumpers, etc.? Should prescribed burning be a part of management of such areas? Should we set up different suppression policies and burned area objectives for them? What are the benefits from fires in such areas and the damages as related to water yield, sediment production and recreation?

b. The Analysis Digest and Summary.

Owing to slow and difficult ground travel, the establishment of wilderness areas has created difficult problems in fire control.

Problems of fire control have not been solved in these roadless areas. Costs of suppression are great when concentrations of lightning fires cannot be handled by the available supply of smokejumpers and firefighters must travel long distances afoot.

Many of these inaccessible areas are our highest water-producing areas. Their value for this purpose demands good protection.

It is doubtful that reduction of hazard in these areas by prescribed burning could be justified from a cost-benefit standpoint. Limited prescribed burning for critical fuel reduction, water, wildlife, recreation, or other management purposes may be justified on occasion.

The high cost of suppressing project fires in roadless areas indicates the necessity of continuing fast, energetic, and thorough suppression action on all fires in these areas.

B. Standards of Protection by Management Units.

a. The Analysis.

We have set standards of protection for broad areas usually expressed in percent of burn allowable. This percentage is often used on a national, state, regional or forest basis. It is confusing to the public and does not provide a true picture of the status of protection. Any large unit of area may show satisfactory protection when so expressed, but we are managing smaller units of land, working circles, watersheds, grazing, allotments, recreation units, or wilderness areas. It does not appear logical that management units with widely separated objectives should all be protected to the same degree. Too often this is the case today.

Do we need a fresh look by the resource manager as to what standard of protection is actually required for each of the management units in order to permit satisfactory management of the various units for the purposes for which they were established?

The questions may be raised: What is adequate fire control in the Mississippi longleaf pine stands? In New Hampshire? In the high mountain watersheds of the Northern Rockies? In the

brush fields of Southern California? In the various forest types comprising our working circles? In the sagebrush areas of the West?

b. The Analysis Digest and Summary.

For years our protection standards have been based on broad areas with indicated percentages of allowable annual burn. These have long been recognized as inadequate to provide a sound basis for planning the protection of a management unit.

Suggested methods of establishing more satisfactory protection standards for individual management units are:

1. Minimum cost and damage method.
2. Maximum permissible damage method.

The first is based on a determination of the highest monetary return during a rotation period considering cost of protection plus damage. The second is based on a determination of the maximum loss that can be sustained during a rotation and still permit effective resource management. Both methods use the rotation period as the period over which losses must be absorbed.

To establish protection standards by management units, instructions must be prepared for evaluating the value of the resource to be protected and the damage caused by fires.

C. Recommendations.

Silviculture.

1. Additional emphasis is needed on the integration of fire control objectives and methods in all forms of silvicultural treatment of timber stands to assure the best possible long time results from overall management.

W. O. Comment - This recommendation involves consideration of various methods and types of silvicultural treatment of timber stands on the problems of fire control. Simply stated it means that every effort should be made to assure that the adverse impact of any chosen silvicultural treatment of a timber stand on fire control is kept as low as possible and if there is a choice of silvicultural systems to apply the one that will provide the least difficulty to fire control should be used. Which means that Fire Control and Timber Management personnel must work in close harmony when Timber Management plans are being prepared.

The recommendation is approved and assigned to the regions for further intensification along the lines suggested.

Fuels.

1. Increased timber utilization should be encouraged to reduce fuels left after logging, wind-throw and deadening.

   W.O. Comments - The question of utilization is largely one of economics. However, it is a sound objective and one we should continue to stress in all our timber sale activities. Assigned to the regions recognizing that research has a place in this work, also.

2. Expanded and continuing studies should be made to determine the best methods of using fire to reduce fuels and to determine its effect on soil, water and cover.

   W. O. Comments - Much work has been accomplished in this field. But there remains a tremendous job to be done to arrive at the answers to the many problems connected with the use of fire to reduce fuels, particularly in the heavy logging slash areas of Regions 6, 1, 3, 5 and parts of 4 and 2, also in the Lake States - particularly the Superior National Forest. The recommendation is approved. Assigned to Research as a primary responsibility with secondary responsibility to Administration.

3. A study should develop a practical method of determining whether slash should be burned or left unburned on specific areas.

   W.O. Comment - This recommendation is very similar to recommendation No. 2 above. It is approved. Assigned to Research with the understanding administration is expected to collaborate as needed.

4. A coninuing search is needed for mechanical or other effective non-fire methods of slash disposal.

   W.O. Comment - Approved and assigned to the Technical Equipment Board, W.O. for action.

Water.

1. Require that all resource management plans provide for maintaining soil stability as close as possible to normal and that they be designed to increase stream-flow wherever possible on each management unit and that the fire control necessary to obtain this objective be provided.

   W.O. Comment - The fire control necessary to obtain the objectives mentioned will, of course, require additional funds. That part of the recommendation dealing with inclusion of soil stability

stream-flow factors in resource management plans is, of course, a sound recommendation and should be done insofar as it is possible. Assigned to regions for action with collaboration of Research.

2. Require that all resource management plans include provision for restoring satisfactory watershed conditions on hazardous burns as soon as possible.

W. O. Comment - This recommendation is approved provided methods are known which can be applied to obtain satisfactory restoration of watershed conditions following a burn and provided funds are available for this purpose, the use of which can be defended by economic analyses and benefits that will accrue through such restoration work.

Assigned the regions for implementation with collaboration from Research.

3. For all prescribed burning require complete correlation of fire control and watershed management plans.

W. O. Comment - Recommendation approved. Assigned to the regions for implementation with collaboration from Research.

4. Undertake this year preparation of a handbook of practical procedures for evaluating the hydrological and on-sight productivity effects of fires.

W. O. Comment - Director Bailey has agreed to assemble the data now available in form for use by field men. The recommendation is approved and assigned to the Intermountain Station.

5. Expand research as rapidly as possible to include qualitative and quantitative studies of hydrologic effects of fire on major soils and cover types.

W. O. Comment - This recommendation is approved subject to availability of funds to implement any new projects that may be needed.

Inaccessible areas.

1. Present protection standards on wild and wilderness areas should not be relaxed.

W.O. Comment - We are glad to see continued approval of the existing protection standards involving wild and wilderness areas.

2. Policy on the use of motorized equipment for fire preparedness and suppression in wild and wilderness areas should be clarified.

W. O. Comment - Work directed toward the clarification of the policy on the use of motorized equipment in wild and wilderness areas will be undertaken in the near future. Assigned to the Washington Divisions of Fire Control and Recreation and Lands for action.

3. Use of aerial facilities including smokejumpers and helicopter in the protection of wild and wilderness areas, should be increased.

W. O. Comment - It will, of course, require increased appropriations to permit substantial increase in air operations pertaining to the protection of wild and wilderness areas. We approve the general thesis of the recommendation insofar as available financing will permit. Use of helicopters in wilderness areas will normally require the construction of heliports. A study will be made of the problem in location of heliports in wilderness areas and a policy issued covering this phase of fire operations. Assigned to the Washington Office Division of Fire Control.

Standard of protection.

1. Instructions should be prepared to permit more accurate evaluation of the resources being protected and the damages resulting from fire.

W. O. Comment - The questions raised by this recommendation have been plaguing the Forest Service for years. Some progress has been made in the evaluation of intangible damages resulting from fires. The greatest progress in this field has been made in southern California through the efforts of Region 5 and the California Forest and Range Experiment Station. However, much work remains to be done in this field. The development of formulae for the evaluation of intangible damages resulting from fire is largely a research problem. Development of formulae proposed by this recommendation has already been undertaken by the California Station and will be coordinated by Research between interested Regions and subject matter Divisions.

2. Standards of protection determined by the value of the resource protected and damage caused by fires should be established by management units.

W.O. Comment - Region 8 is presently establishing standards of protection for each of its timber management working circles. They are using the empirical approach since scientific information is lacking in this field. The establishment of standards

of protection by the management units (such as working circles) cannot be on a scientific basis until the work proposed in recommendation No. 1, above, is completed. However, the general recommendation "that standards of protection should be established by management units" is approved.

Insofar as it is possible "standards of protection" should be included as part of management plans for working circles, watershed management areas, etc. Until such time as research information is available making it possible to establish such standards scientifically it will prove necessary to establish them on an empirical basis. Assigned to regions for implementation with collaboration of Research.

Note: The recommendation for establishment of "standards of protection" for management units does not relax the policy of hitting all fires fast and hard. Nor shall it be construed as a relaxation of other phases of the Forest Service Fire Suppression Policy.

FOREST FIRE PREVENTION

More than 50% of all fires starting on national forest protected areas are man-caused. 55% to 70% of all man-caused fires are started by people living in or near national forests. The soaring costs in suppression, the increasing value of the resources being protected forces attention to the problem of Fire Prevention. Where do we stand in this important phase of Fire Control?

A. Statistical Measurement of Where We Stand.

a. The Analysis.

Numbers of man-caused fires by major causes per million acres were charted separately by regions and all national forests for three periods 1935-1938, 1942-1944, 1948-1951. Also charts were prepared showing average annual area burned by causes for 1941-44 and 1948-51.

b. Analysis Digest and Summary.

On Chart 24 is shown a breakdown of fires per million acres protected separately for Regions 1 through 9 for the three time periods - also shown in a summary for all regions.

From the information provided on Chart 24, it is apparent that the number of man-caused fires has been reduced in recent years. We know from other sources of information that during this same period, we have had increased use and industrialization on the national forests. This era was also marked by an increase in prevention effort such as the Co-operative Forest Fire Prevention campaign and the Keep Green movement. These statistics have not been coordinated with the severity of burning conditions. Fire index has great influence on the number of man-caused fires, and statistics like those shown on chart 24 need correlation with that factor and with prevention efforts to more adequately measure trends.

Chart 25 shows the average annual area burned in national forest protection areas, Regions 1 through 9, by causes, for two periods: 1941-1944 and 1948-1951. This chart also gives the average annual dollar damage assessed fires for the same period by man-caused and lightning fires.

MAN-CAUSED FIRES

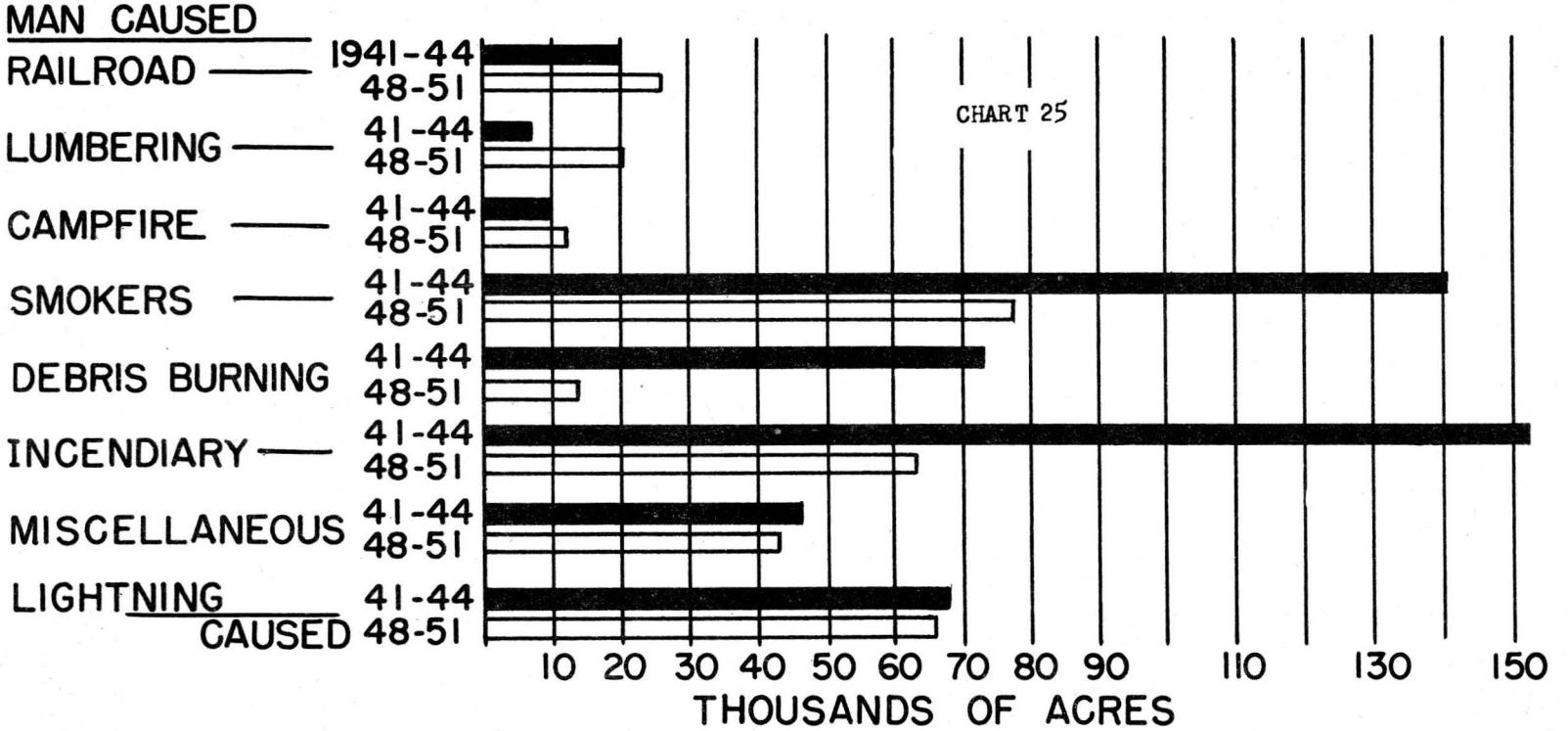
BY CAUSES- BY PERIODS
(AVERAGE ANNUAL)
PER MILLION ACRES

	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9	R-1-9
RAILROAD										
1935—1938	1.58	.66	.41	.09	2.11	.48	11.54	11.87	10.76	1.75
1942—1944	2.37	3.48	.82	.16	3.93	1.07	9.45	11.05	5.88	3.03
1948—1951	.42	1.17	.27	.27	2.16	.38	2.99	5.84	3.97	1.24
CAMP FIRE										
1935—1938	2.93	1.84	3.50	3.47	4.38	6.88	8.74	26.86	25.10	5.42
1942—1944	.85	2.24	2.54	1.48	2.10	2.06	3.15	10.05	3.01	2.49
1948—1951	1.25	2.15	3.37	1.79	3.56	4.58	1.27	5.37	3.32	3.01
SMOKER										
1935—1938	6.86	3.78	8.73	5.61	17.64	12.17	45.80	121.31	117.30	16.95
1942—1944	2.87	4.02	7.09	3.52	15.19	4.46	13.93	60.88	31.84	11.84
1948—1951	2.33	3.78	6.33	2.43	13.82	5.85	8.82	37.91	22.65	9.29
DEBRIS BURNING										
1935—1938	.94	.43	.55	.91	2.52	2.03	25.87	52.91	168.78	8.36
1942—1944	1.03	.35	.27	.45	1.83	.51	8.55	21.43	17.63	3.69
1948—1951	.73	.79	.62	.55	1.80	.86	3.89	13.92	10.82	2.63
INCENDIARY										
1935—1938	.19	.09	.28	.26	1.94	1.37	44.06	176.69	106.12	10.93
1942—1944	.07	.09	.14	.13	1.16	.15	6.60	115.12	39.61	11.08
1948—1951	.07	.05	.18	.06	2.04	.15	2.69	77.06	21.51	7.70
LUMBERING										
1935—1938	.52	.28	.32	.23	1.11	.89	2.80	14.50	6.54	1.28
1942—1942	.50	.15	.50	.10	.98	.59	.75	2.91	.63	.64
1948—1951	.31	.44	.64	.12	2.26	1.46	.45	2.72	1.17	.99
MISCELLANEOUS										
1935—1938	1.24	.99	.86	.94	7.97	1.44	10.14	18.79	40.51	4.03
1942—1944	.85	1.74	1.41	5.00	7.55	1.47	6.90	18.69	12.17	4.24
1948—1951	.83	1.66	1.70	1.02	8.05	2.12	5.23	11.92	8.33	3.85
TOTAL										
1935—1938	14.26	8.07	14.65	11.51	37.67	25.26	148.95	422.93	475.11	48.73
1942—1944	8.54	12.07	12.77	10.84	32.74	10.31	49.33	240.13	110.77	36.92
1948—1951	5.94	10.04	13.11	6.24	33.69	15.40	25.34	154.74	71.77	28.71

CHART 24

AVERAGE ANNUAL AREA BURNED BY CAUSES

NATIONAL FOREST PROTECTION AREA — REGION 1 THROUGH 9



AVERAGE ANNUAL DAMAGE BY CAUSES NAT. FOR. PROTECTION AREA
REGION 1 THROUGH REGION 9

MAN CAUSED	1941-1944	$ 1,086,436	LIGHTNING CAUSED	1941-44	$ 77,357
	1948-1951	$ 5,512,184		1948-51	$ 2,004,549

B. Industrial Fires.

a. The Analysis.

Railroads, logging, power lines and other industrial operations in the forests are having serious impacts on our resources because of the numerous fires they are starting.

Stipulations in numerous railroad easements are mandatory as to right-of-way hazard reduction requirements. Timber sale contracts and other instruments contain specific fire prevention stipulations.

Yet we are not enforcing all of them, or it is an uphill fight to obtain enforcement. What needs to be done?

b. Analysis Digest and Summary.

Under this category we get the fires from railroad-engine exhausts, from right-of-way clearing; fires from woods-sawmill exhausts, burning slab and sawdust piles; fires from power saws, truck and tractor exhausts; and in instances, fires from blasting of stumps or logging-road construction. Coming more into the picture are fires from power lines. Logging-slash-disposal fires are also a serious problem.

Trends in number of fires caused by industrial operations are as follows:

Cause	1945	1950	1952
Railroad	445	245	196
Logging	116	179	209
Power Line	10	30	28
Other Industrial	236	246	267
Total	807	700	700

These fires are resulting in serious damage to resources, high cost of suppression, and time-consuming trespass cases. Stipulations in numerous railroad easements, and some State laws, are mandatory as to right-of-way hazard-reduction requirements. Timber-sale contracts and other instruments contain specific fire-prevention stipulations. Some of these need improvement; however, we are not enforcing all of the present requirements.

Fire reviews disclose the seriousness of our failures in this important fire-prevention work. To do a better job we must continue to improve coordination between resource managers and fire control in fire-prevention planning and enforcement. We also need to re-emphasize the priority of fire prevention, provide the ranger with necessary means to accomplish the job, train and inspect to insure that it is done and not allowed to be shoved aside by other "must" jobs that appear to be more pressing at the time.

C. Education Efforts.

1. In areas where public attitudes are favorable toward resource conservation.

In this group are fires caused by persons whose attitudes are already favorable towards resource conservation, who did not intend to cause a fire, but who now lack the know-how and understanding of risks they create and how to negate those risks. This group is approachable under mass educational efforts accompanied by the restraints of law enforcement; and particularly through "point of sale" type fire prevention.

The following tables (in numbers of fires per year) indicate by regions the size of their problems and the period trends:

Camp Fire

	R-1	R-2	R-3	R-4	R-5	R-6	R-7	R-8	R-9
1935-1938	78	39	77	107	106	186	25	163	119
1948-1951	36	46	76	59	89	119	8	78	41

Smoker

1935-1938	183	80	192	173	427	329	131	736	556
1948-1951	67	81	143	80	345	152	59	550	279

Debris Burning

1935-1938	25	9	12	28	61	55	74	321	800
1948-1951	21	17	14	18	45	22	26	202	133

Miscellaneous

1935-1938	33	21	19	29	193	39	29	114	192
1948-1951	24	35	39	33	202	55	35	173	138

The Cooperative Forest Fire Prevention campaign, the Keep Green and "point of sale" programs are effective in preventing this source of fires. Suggestions have been made that such programs be enlarged to include the use of fire as a tool in resource management. The national fire-prevention education program is geared to reach a great number of people in all classes, ages, and interests, over a wide area and should continue to be restricted to the more popular and general phases of fire prevention. Fire as a tool in management varies greatly between regions and in accordance with local conditions. There is a need, however, for improved local explanation and dissemination of information on the use and effects of planned burning. Such programs should be geared to the local situation and carried accordingly.

We believe we can strengthen national fire-prevention effort by the adoption of a universal smoking code. If such a code can be agreed upon and if the Forest Service gave it wide publicity and others would do likewise, we believe this approach to reducing the number of smoker fires is worth a trial.

2. In areas where numerous local people do not know or have not as yet accepted as valid, the objectives of wild land management.

These people are responsible for most of the incendiary fires. Statistics for regions where this is a major problem are as follows:

Average Annual Fires per Million Acres

	R-5	R-7	R-8	R-9
1935-1938	1.94	44.06	176.69	106.12
1948-1951	2.04	2.69	77.06	21.51

The majority of these fires are caused by persons who do not know or have not as yet accepted as valid, the objectives of managing wild land for timber production and resource protection. This group of citizens subdivide into those who are indifferent as to whether the woods burn, and those who engage in deliberate woods burning either on grounds of honest beliefs or because they set personal advantage or gain from a woods fire above the greater losses suffered by the landowner or the community. Additional progress in preventing this type of fire primarily involves individual case identification and direct person-to-person corrective methods.

Particularly in the Southeast, where incendiary fires are most frequent, this problem deals with a major population having generations of ancestors who believed woods burning was beneficial to both the individual and the community. The practice became ingrained, traditional and fixed. Much of the present rural population was indoctrinated in the righteousness of woods burning by their parents and matured in that atmosphere.

To partially outline the problem, we can say: (a) To the lay observer there are many examples on the ground of occasionally burned areas being more productive of timber than are similar areas from which fire was excluded, (b) The residents believe, and research supports the belief, that livestock in coastal plains areas thrive better on occasionally burned lands, (c) There can be conflicts of land use between tree growers and stock growers, (d) Many residents have not yet accepted either the practicability or necessity for managing timber as a sustained-yield crop, (e) Many of the residents in the fire areas enjoyed little education, have few contacts outside their immediate communities and are not reached by newspapers or radio channels of information, (f) The job involves effecting a complete about-face in public viewpoints, sense of values and interest.

People starting these fires are high-resistance cases upon whom posters, slogans, literature and other standard prevention media have little impact. Each little community, each family, and usually individual members of the family, have to be recognized as separate problems and approached as such.

Extensive cures have been effected. These have occurred where foresters had time available to become personally acquainted with citizens, could listen to their views and problems and understand them, and then on a man-to-man approach gradually bring them to an understanding of what land managers were aiming at and could do. As these efforts are repeated, the citizen's observations and thinking are directed to things he had not previously considered. Often the final meeting of minds occurs only after joint observation trips in the woods. Eventually the spread between the citizen and forester gradually lessens, and here and there an individual whose judgment the local people respect changes his position and becomes an advocate of protection. It is only after a substantial portion of the local leaders change position on a basis of informed understanding that appreciable progress can be made with the community as a whole.

Experience in gaining public prevention support by way of giving the folks an intelligent understanding of some of the relationships between fire and silviculture has demonstrated that the real key to fire prevention in the Southeast is along the road of personal explanations and demonstrations by foresters to

residents, of the basic relationships between fire, tree growth, and other resources present. Foresters have an understandable story on which a sound prevention base can be built. Additional accomplishment will be measured by the amount of time we provide forest officers to get the job done.

D. Conclusions.

A study of the trends of man-caused fires in Regions 1 through 9 indicates that the number of such fires has been reduced in recent years. The trend by periods for lands protected by the Forest Service is as follows:

1935-1938	48.73	average annual fires per MM acres
1942-1944	36.92	" " " " " "
1948-1951	28.71	" " " " " "

Damage to resources from man-caused fires, cost of their suppression, and adverse effects on orderly conduct of other activities are serious problems.

Statistics, such as those above, indicate trends but are not coordinated with burning conditions or prevention efforts. We need an improved method to determine the effectiveness of fire-prevention efforts.

The large number of incendiary fires occurring in Region 8 and to a lesser extent in Regions 9 and 7, we believe, is due to a lack of acceptance by the fire-starters of the objectives and value of resource management. Acceptable degree of future progress in correcting this high-resistance source of fires will require a man-to-man sale of good resource management.

Next to incendiary, the smoker fires are consistently prolific. This problem is being attacked in many ways and the number of smoker fires is being reduced in the face of increased use. One new approach suggested is that all protection agencies adopt a universal smoking rule or code that can be widely publicized.

Railroads, logging, power lines and other industrial operations in the forests are having serious impacts on our resources as they are starting numerous and costly fires. Following our transition from custodians to resource managers there is great competition for the available time of the ranger and his staff. As a result we sometimes overlook getting essential prevention work accomplished. We need to intensify our efforts to reduce the number of industrial fires.

We need better coordination between resource managers and fire control in fire-prevention planning and enforcement. Examples where improvement is needed are: campgrounds located in areas of high risk when lesser risk areas are available; neglect of fire prevention on sales; and hunting seasons during high-fire-hazard periods. There are many other examples that could be cited.

Fire-prevention and the Keep Green programs are an important part of the whole conservation movement. They are effective and should be continued. These programs should not be expanded to include the use of fire as a tool of management. The latter is important and must continue to be handled on a local basis. Application of fire as a tool differs by areas and locally we must give the public the facts so they can understand our action.

On-the-ground prevention is the best method of prevention.

Lightning fires occur annually in large numbers. Weather modification to reduce the number of such fires or their effect on resources has possibilities. Research projects now underway will soon give us additional information on this subject.

E. Recommendations.

1. That a study be undertaken to determine if a universal smoking rule or code of ethics should be adopted.

   W. O. Comment - Recommendations approved and assigned to the Division of Fire Control, W.O.

2. That all resource plans and action programs emphasize further integration and application of fire protection measures as a positive means of fire prevention.

   W.O. Comment - This recommendation has our approval. Great emphasis, in recent years, has been directed toward the inclusion of fire protection and fire prevention stipulations in timber sale contracts, other contracts, special use permits and other instruments providing for the use of the forest and its products by individuals, firms, and the general public. However, we probably have not gone as far as we can in the inclusion of fire protection and fire prevention measures in our resource plans and action programs.

   Assigned to the regions for implementation and action.

3. That in heavy incendiary areas more time be allowed in job standards for the district ranger to sell resource management to local citizens as a positive fire prevention measure.

W. O. Comment - Recommendation approved and assigned to the Division of Operation, Washington, for study and action.

4. Include prescribed use of fire as a tool in the use of fire prevention but on a localized basis.

W. O. Comment - This recommendation is approved provided that prescribed use of fire is in accordance with well thought out plans which have considered the effects of fire on the resources, on the soil, and on the water producing capacity of the watershed involved and that damages to resources are more than offset by benefits.

5. Statistical analyses of fires should include study of fires by classes of people responsible identified as to locals or outsiders.

W. O. Comment - Recommendation approved and assigned to the regions for action. As pointed out by Chief McArdle during the discussion of this recommendation the analysis of the fire prevention problem should uncover the classes of people responsible in order that the prevention program may be directed to those responsible for most of our fires.

6. That a method be developed to measure the effectiveness of fire prevention efforts.

W. O. Comment - A good start has been made on this in the East because of the close correlation between burning index and number of fires. Research will continue work on this phase. Any comprehensive system of measuring results of prevention efforts, must await opportunities to initiate research projects in fire prevention.

7. Increased research effort on lightning fire prevention.

W. O. Comment - Historically, the peak loads of fire business created by heavy concentrations of lightning fires have always threatened to overwhelm the best fire fighting organization that can be created in the Northwest. Research initiated in recent years at Priest River gives great promise of increasing our understanding of these occurrences. At best, we may be able to prevent many of these lightning fires. At least, the research under way should enable more skillful action and planning. Prospective increases in fire research funds will enable some increased support to this project, and should insure its continuation. Since it is not yet certain that a significant reduction in lightning fires will prove feasible, sole emphasis should not be placed on the possibility of prevention.

8. Increased effort to reduce industrial fires.

W. O. Comment - Industrial fires, in recent years, have been having an increasingly disturbing impact on damages to the resources and on fire suppression costs. Every effort should be made to enforce fire prevention stipulations in timber sale

contracts, special use permits, and other instruments provided for the use of our forest resources.

Assigned to the regions for implementation and action.

A. Fire Training.

a. The Analysis.

A stepped up training program may buy more good fire control action at less cost than any other thing that may be done. An analysis of the training of (1) trainers, (2) central schools for fire managers, (3) cooperative training for timber operators, (4) a career program for selected individuals, (5) fire control courses in forestry schools, etc. was made. The need for joining the NFA and research program in training and extension work was also considered.

b. Analysis Digest and Summary.

(1) Facts.

Analysis of suppression action taken in several disastrous class E fires during recent years has revealed elementary mistakes which resulted in major increases in area burned, resource damage and cost of suppression. Generally the mistakes tied in to failures in training--and principally to training at the lower echelons of the fire organization. The mistakes made include basic and fundamental components of the suppression job, such as maintenance of adequate fire line patrol, proper "mopping up" practices, etc.

Some supervisory fire personnel do a satisfactory job of training--others need training in "how to train." Some lack sufficient knowledge relative to fire control objectives, standards, operating practices, basic organization guides, safety requirements, and known factors of fire behavior.

(2) Conclusions.

Adequacy of training is a big factor in determining success or failure in handling suppression work effectively and safely.

There is need for a "new-look" and the establishment of and adherence to Service-wide standard training requirements for all personnel who participate in the field of fire control.

There is need to bring about more effective training at all levels. Particular emphasis should be given to training of trainers.

Training of seasonal and yearlong personnel used in supervising groups of men on suppression work, is needed with special emphasis being given to:

1. Basic fundamentals of fire suppression practices, and

2. Foremanship and safety requirements.

The amount of time and money that should be spent on training varies between forests and regions. Training must be based on needs in each situation. It is a continuing job, and fire managers must be alert to keep training in pace with changing overhead and labor conditions.

B. Inspection.

a. The Analysis made.

Are inspections at all levels, district, forest, region and Washington, dealing with fundamentals or are they more or less skimming the surface and not getting at the "hard core" of our fire control work? What about our inspections as a training medium? Do our inspections of the fire function deal sufficiently with the relationships of fire and resource management? These and a host of other questions were reviewed.

b. Analysis Digest and Summary.

(1) Facts.

During the past several years with the increased volume of work in timber management and other activities, more and more of the fire inspection work on a ranger district has been delegated to the district assistant. At the same time recent reviews of costly Class E fires show that errors in the elementary fundamentals of fire control have contributed materially to the size of many of these fires and to the suppression job. There has been a tendency to assume that men knew how to inspect by virtue of the position they occupied. Review of inspections at the forest levels also showed that reporting and follow-up were too frequently neglected.

Inspection standards, in many cases, are not being met. In many instances job standards against which performance can be inspected are lacking. In other cases the job standards vary between forests and often between ranger districts on the same forest. These factors make inspection increasingly difficult.

(2) Conclusions.

The quality of our inspections has declined during the past several years.

There is a need to give special emphasis on training in inspection techniques, beginning with fundamentals at the ranger district level for the initial attack personnel and continuing through the forest and regional levels. Supervision, inspection, and training are tied closely together and it is difficult to exactly determine where one ends and the other begins.

Inspection standards need analysis to determine their adequacy.

The timing, preparation, report and follow-up elements of an inspection too often have not received the attention needed.

There is a need to secure better correlation between functional inspections.

There is a need to prepare job standards which apply Service-wide.

C. Careers in Fire Management.

a. The Analysis

It has been said by some that the Service career ladder program places a premium on administrative ability and all-around experience. This is laudable, but does the career ladder route, as the way to advancement, make it possible to maintain fire management at a high level of efficiency? Does the use of fire positions (fire control assistants and the like) as a training and proving ground for advancement up the career ladder reduce the over-all efficiency of fire management? Does the rapid turnover coming from our current policies of career ladder advancement assure that men occupying key fire positions are technically competent?

The foregoing points were considered as they applied to the Forest Service organization and personnel policies directly affecting the fire control job.

Should there be two career ladders - one dealing with the field of intensive resource management, the other with intensive fire protection? Is the fire management job alone important and big enough to provide incentives in the form of a career ladder in fire control?

b. Analysis Digest and Summary.

(1) Facts.

In several regions the fire occurrence and suppression problems do not justify a separate fire management career ladder insofar as professional personnel are concerned. In the heavy fire regions such a ladder would probably prove costly, and result in an organization tending toward departmentalization. Too, experience has shown that the anxiety, worry and physical drain on personnel in fire work tends to shorten the useful Service life of such personnel, and after spending a major part of their Service career in the highly-specialized field, they have difficulty in finding other avenues for continued employment. Ogden conferees strongly favored personnel advancement as not limited to the fire control field but rather that they be considered for advancement in administration where they would continue to use their fire control abilities and aptitudes. The group recognized, however, career possibilities for certain individuals having special aptitudes and interests in the fire control field.

Some of the heavy fire regions report an alarming decline in the effectiveness of the yearlong and seasonal forces of non-professional personnel. Analysis in one region shows only 10% of non-professional key pre-suppression men as having had three seasons or more experience; 77% with less than one season. The replacement problem is extremely difficult because of competition for workers by industry and other agencies, which offer more attractive salaries, longer tenure, more adequate housing facilities in many instances, and stepped-up welfare and employee benefits.

General feeling through the discussion at Ogden was opposed to departmentalizing fire control work. Strong preferences was voiced toward the present organizational plan which provides for close integration of fire activities with the other functions and duties of administrative officers.

Safety is recognized as a sound investment in bringing about improved morale, stepped-up production, lessened turnover, increased security and happiness to employee and family, and in decreased cost of protection.

(2) Conclusions.

Special consideration needs to be given to bettering conditions for non-professional yearlong and seasonal personnel who form the core of basic protection organizations.

Boards of Review primarily should (1) be conducted as a training medium, and (2) be used to determine good and bad practices employed in order that results may be codified to permit more rapid improvement in future fire operations. Cases involving negligence or incompetency should result in full investigation on the part of Personnel Management personnel working in conjunction with Fire Control.

D. Personnel Aspects of Fire Management.

While discussion at the Ogden meeting dealt principally with the three subtopics--Training, Inspection and Careers--strong recognition was apparent of the importance of "personnel placement" in the Fire Management picture. To effectively meet our responsibilities in fire activities it is, of course, vital that we have the "right man in the right place at the right time." Too, the all-important factor of "human relations" was given emphasis.

Safety, while not treated as a separate sub-topic, was stressed by various conferees, and there was strong recognition of its importance in the planning, training and inspection activities.

E. Recommendations.

a. Training. It is recommended:

1. That each region reanalyze its fire training needs; plan and execute a training program designed to bring about efficient performance at all levels in the field of fire prevention, presuppression and suppression. That effort in such training programs be directed, in addition to raising the general level of performance in the field of fire control, to the elimination of costly elementary errors and mistakes. The program should include but not necessarily be restricted to:

Training of trainers (methods of training as well as fire subject material.)

Training of fire managers.

Training all other yearlong personnel having direct or indirect fire responsibilities.

Training seasonal personnel and cooperators.

Self training and on-the-job training.

Special training in fire prevention and law enforcement.

Joint training meetings with other protection agencies.

"Hot" fire reviews to determine and correct mistakes, and to provide information relative to errors and or commendable practices for dissemination to other units for training purposes.

Use of intra and interregional details to project fires to the fullest extent practicable for training and developmental purposes.

W. O. Comment - These are excellent recommendations and have our full approval. As Regional Forester Hendee and others remarked; "if we could accomplish all of these recommendations the fire control job would be simple. The big job ahead is for each region to get the training job done."

It was also mentioned repeatedly by research and administration that research has a big job of codifying all information available even though incomplete. This is also an excellent recommendation since it is vital to an effective training program and efficient operation in the field of fire control. The recommendation implied by this paragraph is approved. Assigned to Research.

2. That fire control men in supervisory positions or others in positions of responsibility who are taking an active part in the control of project fires be trained to apply research and other information to improve safety to firefighters in "blow-up fire" fire situations. Thorough fire training is a major issue in accident prevention.

W. O. Comment - This recommendation, no doubt, has reference to the deaths which occurred on the Rattlesnake Fire on the Mendocino Forest in 1953 and on the Man Gulch Fire on the Helena Forest in 1949. We are quoting direct from the Mendocino Board of Review Report on the Rattlesnake Fire since the recommendations in that report have a direct bearing on the recommendation mentioned above.

"Safe and efficient fire control action must be based upon a good understanding of fire weather and fire behavior under various fuel and topographic conditions. The Board believes that these factors were especially important on the Rattlesnake

Fire, but that advancement of knowledge and training in these subjects is a Service-wide problem calling for the following action:

High priority should be given in the Forest Service Research Programs to the development of additional knowledge of fire weather and fire behavior.

Research results now available on fire weather and fire behavior should be disseminated in the form of well illustrated, readily understandable publications, training aids, and other guides. We recommend that administration and research participate jointly in this program.

Greater use should be made of portable weather instruments in determining local weather conditions as an aid in evaluating situations at the site of fires.

Fire weather and fire behavior training should be stepped up to include advanced training of key overhead personnel and general training of all seasonal employees. We should attempt to develop more top level fire behavior fire experts in the administrative organization who, in turn, can spearhead training in each region.

The foregoing recommendation is so important that we are assigning the responsibility for accomplishment jointly to regions and stations.

3. That forestry schools be encouraged to strengthen courses in principles of fire behavior and associated courses important in the field of fire control.

W. O. Comment - This recommendation has our approval. It is being assigned to the Washington Office Division of Personnel Management for action.

4. That a service-wide system of recording fire training and experience be adopted.

W. O. Comment - We assume that this recommendation means that some Service-wide system of recording fire training and experience be adopted for application by the regions. We are not assuming that it was the intention of the conferees to recommend that detailed records on fire training and experience be maintained at the Washington Office level for all field employees having direct or indirect fire responsibilities.

We are in full agreement that each region should keep records on the fire training and experience of those individuals in the regions playing an important part in the field of fire control.

Regarding a Service-wide system that is being recommended we are assigning the W.O. Division of Personnel to study this problem and to determine the practicability of setting up such a system.

b. Inspections. It is recommended:

1. That a concentrated drive to raise the quality of inspections at all levels be conducted Service-wide.

2. That a real effort be made to eliminate superficial inspections.

3. That correlation between functional inspections be secured.

4. That increased emphasis be given to the training of inspectors in correct procedures.

5. That inspection standards be reviewed and analyzed for adequacy.

6. That Service-wide fire control job standards be established.

7. That regional training programs be expanded to include training on inspection techniques. This should include written training instructions on inspection.

W. O. Comment - It was stated during discussions of these recommendations that an additional number of inspections was not needed. What was needed was to raise the quality of our inspections. It was also pointed out that it was very important to obtain full acceptance by the supervisor and ranger as to their responsibilities in this field. It was further pointed out that too often, the district ranger is leaving too much of the inspection work to his general district assistant, fire control assistant or other personnel of similar qualifications. One region stated that recommendation number 3 might be interpreted as meaning more than it does. This region is in favor of approving this recommendation provided it does not go beyond the field of fire control.

Recommendation No, 3 was discussed in detail during the Ogden Fire Conference. It was mentioned that a project sales officer when making an inspection of a timber sale too often failed to inspect for compliance with the fire stipulations in the timber sale contract. Conversely staff fire officers when making inspections of project sales inspect more for compliance with fire stipulations in the contract than with compliance with other stipulations in the contract such as felling, bucking, road construction, etc. In other words, what was meant was that we were becoming too functional when making inspections and were failing to bring to the attention of each other deficiencies noted in each of our respective fields. It was not the intention of recommendation No.3 to convert functional inspections into general integrating inspections - merely that each functional inspector should keep his eyes open and report as to deficiency noted which may not, strictly, be in his particular field of activity.

The recommendations are approved. The regions are being assigned the responsibility to see they are placed in effect. The Division of Fire Control, W.O. is being assigned the job of establishing fire control job standards Service-wide in collaboration with the Division of Operation. The Division of Operation is assigned the responsibility of raising the quality of inspections at all levels.

c. **Careers In Fire Management.** It is recommended:

1. That classification standards for non-professional fire positions be studied to determine correct position grade, giving full consideration to relative responsibilities.

2. That a career ladder be recognized in the non-professional grades and that the recognized span of non-professional grades be extended.

3. That emphasis be given to provide yearlong employment to key non-professional personnel through use of all purpose crews, off season details, and in other ways.

4. That every possible means be used to provide adequate housing accommodations for non-professional personnel.

5. That present organizational philosophies providing for integration of fire with other activities be continued.

6. That action be taken to recommend granting of meritorious or other types of awards in recognition of performance in the fire suppression as well as in other fields.

7. That fire supervisory, training, and inspecting officers be every mindful that accident prevention is a good sound investment, and that they have a tremendous responsibility to the thousands of fire workers and their families.

W. O. Comment - The Division of Personnel Management, W.O. is being assigned the responsibility to study and report on Recommendations 1 and 2.

We are heartily in agreement with the remainder of the recommendations. Regions are requested to act on recommendations 3 and 4 insofar as available funds and thorough integration of available funds will permit provided that when attempting to lengthen the period of employment care is taken to assure the number of men available for initial action on fires is not reduced materially. Recommendation No. 7 was covered in one of the recommendations under the topic, Fire Training. However, we are leaving Recommendation 7 in under this topic "Careers in Fire Management" since we recognize, as we know you do, that accident prevention is a good sound investment and that we have tremendous responsibilities to the thousands of fire workers and their families who from time to time help us out during our emergency periods.

We were glad to note that no one wished to advance the thesis that fire control should be departmentalized and that the organizational philosophies expressed in Recommendation 5 should be continued.

INTERREGIONAL USE OF ORGANIZED FIRE FIGHTERS AND OVERHEAD

A. Key Fire Overhead.

a. The Analysis.

A study was made to determine the extent to which forest officers were being used on interregional fire suppression details.

b. Analysis Digest.

The following table provides data by regions on the extent of such details:

	1953		1952		1951		1950		Total	
Region	Men	Mo.	Men	Mo.	Men	Mo.	Men	Mo.	Men	Mo.
1	20	4	174	29	24	4	0	0	218	37
2	0	0	0	0	10	4	0	0	10	4
3	81	24	25	8	20	6	5	2	131	40
4	36	9	18	3	85	32	31	6	170	50
5	5	3	0	0	102	50	0	0	107	53
6	96	18	0	0	0	0	54	20	150	38
Totals	238	58	217	40	241	96	90	28	786	222

c. Summary.

Regions 7, 8 and 9, because of the distances their men must travel, are not "called on" to send men to western fires. Most all western regions participate extensively in interregional details of their men to assist in suppression of fires.

All regions agreed that it was good practice to assist each other in suppression when critical fires were in progress. It was recognized, however, that each region should, in-so-far as possible, handle its fire load and not call on other regions for help except when intra-regional overhead was inadequate to do the job.

B. Interregional Use of Organized Fire Crews.

a. The Analysis.

An analysis was made to determine the extent to which organized fire crews were being used interregionally during 1953.

b. Analysis Digest and Summary.

Data developed from these analyses show that during 1953:

(1) 2022 Indians were used interregionally on 12 fires which burned approximately 170,000 acres.

(2) Time from request for the Indians to arrival on the fire varied from 9 to 45 hours - averaging about 15 hours in Region 5, the Region of heaviest use.

(3) Number of Indians per fire on which used varied from a minimum of 27 to a high of 573.

(4) Total transportation cost - primarily airplane was $178,362 or about 92 cents per hour on the fire.

(5) Travel time was 41,886 man hours at a cost of $60,231.

(6) Transportation costs plus travel time costs totalled approximately $1.23 per hour on the fire.

(7) Use of Indians in 1953 involved the expenditures of $523,471 in addition to subsistence costs and cost of equipment and facilitating gear. Total man hours on the 12 fires were 194,266.

(8) Hourly cost per hour on the fire was $2.70.

(9) Regions 7, 8, and 9 are not involved in interregional use of organized fire crews.

(10) Region 5 is benefited most through the use of such crews with more than 80% of such use involved in the control of Region 5 fires.

(11) Region 3 carries the heaviest load in the interregional use of organized crews since it is primarily from this region these crews are obtained. Probably 90% of the time of recruiting, training, organizing, and dispatching is borne by Region 3.

C. Recommendations. It is recommended:

a. That interregional details of key fire overhead be continued.

W.O. Comment: Approved with the understanding that each region must do everything within its power to handle its own problems and to hold requests for overhead help to a minimum consistent with thoroughly founded fire suppression needs.

b. That interregional use of organized fire fighters be continued.

W. O. Comment: Continued interregional use of such crews is approved on the following basis:

(1) Provided the requesting region has done everything possible, through its prefire planning work, to handle its own suppression load, and

(2) That the requesting region, at the time of the fire or fires in question, has exhausted resources available to it within its own borders within time limits approximately equal to the time required to obtain forces from other regions, and

(3) That request for interregional organized fire fighters is limited to those fires which (a) are either in the process of making a major run, (b) have made a major run, (c) are sure to make a major run prior to their arrival, or are so close that interregional forces are certain to arrive in time to prevent a major run.

c. That commercial aircraft and facilities or equivalent air transportation will be used to transport interregional forces.

W. O. Comment: Safety of fire forces makes it mandatory that we provide air transportation equivalent to that provided by such airlines as United, Frontier, American and others recognized as meeting all CAA requirements for passenger transportation.

d. That wages of interregional organized fire fighters will be at the hourly rates paid in the region where the fire is burning. For example whenever Region 3 Indians are used in Region 5 they will be paid at Region 5 rates. When Region 3 Indians are used in Region 3 they will be paid at Region 3 rates,etc.

W. O. Comments: Approved with the understanding that fire fighters scheduled for interregional use are informed of the rate they will be paid prior to leaving for the fire.

STOCK TAKING IN THE TECHNICAL ASPECTS OF FIRE CONTROL

A review of the history of fire research and its contribution to the success of fire control was presented at the Ogden Meeting. Much of this information is included in the material for Major Topic VI of the Ogden Fire Control Meeting notes. The review of the history of progress in technical aspects of the fire control problem was considered chronologically for the following periods: 1910-15, 1916-20, 1921-28, 1930-32, 1933-40, 1942-46, 1947-54. The men and facilities available and the effect of research on fire control practice was reviewed from this background.

A second more detailed review of just where we stand in technical knowledge in 1954 and in its application in fire control management was then conducted by panel discussion with Director George Jemison, J. S. Barrows and C. C. Buck as the leading participants. This was followed by general discussion by the Ogden group. The discussions were directed specifically toward the following four questions:-

1. Where do we stand in technical knowledge and its application?

2. What are today's problems in fire management that need research and what are their priorities?

3. Where do we stand in respect to fire research personnel and facilities?

4. What do we need to do to assure a sound technical basis for future progress in fire control?

A brief summary of the discussions and the main conclusions from these presentations and discussions are briefly stated for each of these four questions in the order listed. The resulting recommendations which have particular reference to question No. 4 conclude this section.

Where do we stand in technical knowledge and its application.

The more important contributions of fire research in the past fall in the following categories:

1. Fire behavior or the measurement and analysis of the effect on the ignition and spread of fires, of changes in weather, changes in fuel, and variations in topography.

From such studies have come: (a) most of the information used in training men to anticipate the behavior of the average fire and to control it effectively, (b) the measured data on which fire danger rating systems have been built, (c) fire weather forecasts to provide advance information on pending weather changes, and consequently, on the changes to be anticipated in fire danger, (d) classification and rating of fuels, (e) dispatching guides to help anticipate the rate of spread on a going fire.

2. Fire Danger Rating. The development of systems of rating the relative danger of fires starting or spreading under current seasonal and weather conditions had proved highly valuable to the fire manager. The first system was developed by Gisborne in 1933. Since that time all regions of the Forest Service have adopted a system of fire danger rating developed by Research. Other fire agencies have progressively accepted the daily rating of fire danger as a part of their regular fire control operations. The purposes served by such systems have recently increased in both variety and importance. New research to make fire danger rating a progressively better management tool has not kept pace with this expansion.

3. Fire Control Planning - or the operational research approach to the problem of getting timely control action on every fire that may start in a given protection unit. This involves the establishment of time standards that must be met and the placement of fire lookouts, transportation, communication, fire equipment and fire control personnel in proper geographic and organizational relationships to meet those standards at costs in keeping with the values at stake. Such work has provided the guide lines to systematic fire control and has made "coverage" of all protected area an accepted prerequisite of organized protection. Its influence has been to establish definite standards for both plans and performance in fire control.

4. Statistical analyses of fire experience. Through such methods fire control policies, methods and plans have been tested and improved, and the results of past experience have been clearly established for future guidance.

5. Studies in Fire Effects.

   (a) Prescribed use of fire for land management purposes. In the South, knowledge of fire behavior and fire effects has been used to develop methods for using fire safely and effectively to cut down fire hazard, control brown spot, prepare seed beds, check

encroachment of hardwoods on pine, and improve grazing. Research has shown (1) what the damage and benefits are from fire in such cases and (2) how and when to burn to get desired results.

(b) Special methods have been developed for anticipating the variations in total fire damage in one sub-unit compared to another in southern California's critical watersheds. This work has enabled much better allocation of capital investments in high cost intensive protection.

(c) Fire damage studies by Research elsewhere have provided the justification for protection and the basis for estimating the damage suffered annually from fires.

Summary.

The obvious conclusions from these presentations were that fire research effort has paid off well in the past. Over the last 30 years it has established the existing technical basis for anticipating fire ignition and behavior, for planning the fire control organization, for training fire control personnel, and for improved strategy and tactics in fire fighting. It has contributed as well to the policies, guide lines and operating methods in general use, and to the development of special equipment and a variety of special technics utilized in practice.

Unfortunately, most of these things are incomplete. In general, they make good use of the best that is known from both research and experience. The complex physical and biological relationships inherent in the varied response of fire to different outdoor environments, and the consequent variation in effects are still only partially understood. In addition, experiences in fire control prior to 1940 have become increasingly unreliable as guides to the future, because of the rapid changes that have been taking place both in the forest environment and in social and economic conditions throughout the U. S. A.

In fire behavior, previous concepts have visualized the spread of fire as a two dimension phenomena, like a film of liquid spreading on a waterproof surface. As such, control of a fire could become a simple problem in plane geometry by which if control line is built faster than the fire makes new perimeter, the fire would be automatically controlled.

Instead, the concept of a fire as a generating source of heat energy in a three-dimensional atmospheric environment is now

emerging. Even a hundred acres of heavy slash may release more energy in burning than the 20 KT A-bomb described in the civilians atomic handbook. This more realistic concept of the problem of large fires has been developed only in preliminary studies. But it is clear that basic studies in the dynamic relationships of radiation and of air flow are a necessity to improved anticipation of blow-up fire behavior and of more skillful control methods.

Most fire control plans were developed in the 1930's. Many changes have occurred since. For example, a man was the sole unit of fire fighting force. Mass manpower is no longer a dependable or feasible means of accomplishing control of large fires. More machines and modern technology must be skillfully brought to bear on the problem.

In fire control operations, high costs need close scrutiny. Both effectiveness and efficiency of each action, both separately and in combination with others, need new study. Operation Research technics give much promise if applied in this field.

Aerial fire control needs to become a means of giving close air support to ground fire fighting. This is still in the future.

Chemicals have not yet become a tool of the forest fire fighter. Development has lagged in this field.

The demand for use of fire as a tool to accomplish many purposes in nearly every regional environment is a challenge to fire research to establish all facts that determine the ratio between benefits and damages. It challenges too many conventional fire control policies and practices.

Research along each of these lines is planned and some progress is being made through current programs.

What are the current problems in fire management that may need research and what are their priorities?

These discussions gave new significance to the preceding discussions on problems and recommendations dealing with various phases of fire control management.

In brief, it became clear that though the technical base for systematic forest fire control and for many policies and practices has been developed through research over a thirty-year period, and there is now some highly productive and significant research in progress, the picture is far from bright when specific 1954 needs and problems are considered. The problems are big, and demand exacting research,

but presently available research facilities are too limited to permit rapid progress on the technical problems that must be solved.

Some of the evidence of these problems and needs was brought out in the parallel analyses of fire control management. The more important are:

(a) Sharp increases in the property value and in the importance to the American people of all forest resources,

(b) The recent uptrends in both the value and extent of forest resources lost to fire.

(c) The evidence that in many situations conventional methods of fire fighting are not good enough to prevent the conflagration fire,

(d) The challenge posed by high labor costs and the inefficiency of available mass manpower, and

(e) The challenge posed too by the changing personnel aspects of fire control management, which cannot be solved alone by increased fire control funds.

These reflect the background problems in fire management.

More specifically, for 1954 eight Service-wide major fire management problem situations were cited by Gustafson, for which better solutions are urgent and which demand attention from Research. These were accepted by both conferences with little modification, except for expansion to nine captions instead of eight. Others could be added, but these nine have most effect on the losses suffered each year and on the level of fire fighting expenditures. These problems include:

1. The great conflagrations that are an almost yearly occurrence in California and other parts of the West.

2. The concentrations of lightning fires in the Northern Rocky Mountains and other western areas.

3. The periodic and as yet unpredictable occurrence of exceptionally damaging fires in the Black Hills and other areas.

4. The increasing accumulations of logging slash and heavy fuels in the West.

5. The large number of man-caused fires in the South.

6. The still troublesome problem of designing, organizing, equipping and training fire organizations that can consistently make fast and efficient initial attack on all threatening fires.

7. The ability to expand and contract fire control forces in accordance with changing situations.

8. The safe and effective use of fire in hazard reduction and resource management.

9. The correct evaluation of values protected and of damages suffered from fire.

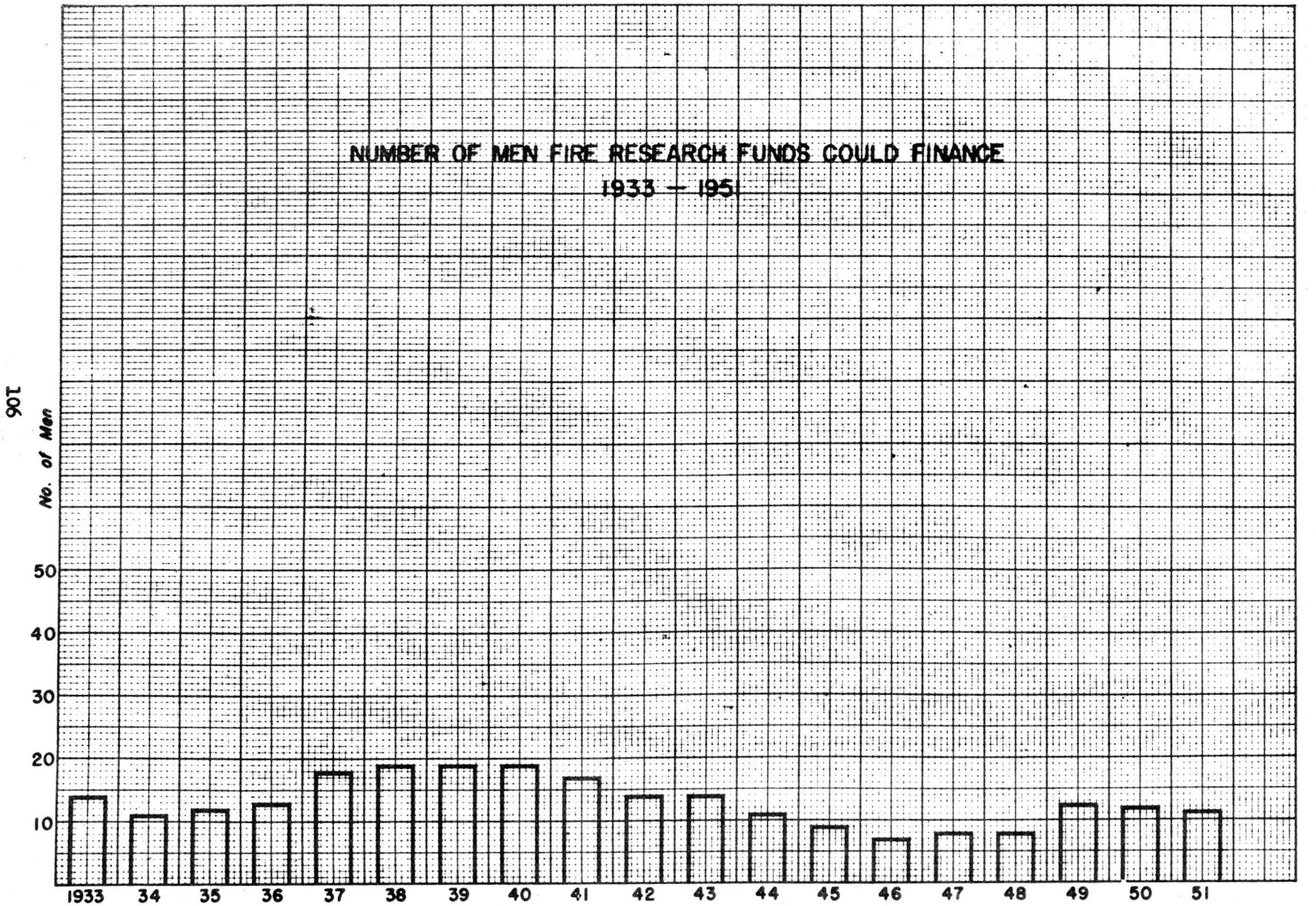
These major fire management problems point directly to a need for more information on fire behavior, better fire planning, improved danger rating, evaluation of fire damages, and fire prevention aids. Each of these problem situations is big. Each has been recognized by Research. All have had some attention in the past or are included in some phase of small scale studies. But the research job still to be done is big in each of these problem situations. Better solutions in fire management demand a much better understanding of certain underlying factors in each, and more exact information susceptible to objective analysis. This in turn, demands a stronger and more intensive attack by Research than has so far been possible.

How do we stand in respect to men and facilities?

The attached graph sums up briefly the trends in number of men engaged in fire research for the period 1933 to 1951, inclusive. The number of men engaged was at the maximum during the period 1938 to 1940, inclusive.

In F. Y. 1954, $133,000 was appropriated for fire research. These funds supported twelve technical men full or part time. Other workers paid from administrative funds have been available in several regions, usually to aid in some special fire research service. It was the concensus of the Conference that the number of men available is woefully inadequate for the job needed.

Men and facilities in fire research need to be viewed from the standpoint of quality and productivity as well as of physical numbers. The lack of funds has resulted in inability to recruit and train the kind of people needed. Such inflexibility has meant a static condition or even a slowly decreasing number of


NUMBER OF MEN FIRE RESEARCH FUNDS COULD FINANCE
1933 — 1951
No. of Men
10
20
30
40
50
1933
34
35
36
37
38
39
40
41
42
43
44
45
46
47
48
49
50
51

key fire researchers. Poor distribution of men by grade and the isolation of individual workers has not been conducive to the highest productivity.

What do we need to do to assure a sound technical basis for future progress in fire control?

1. Developing a better balance in Fire Research.

Notable progress has been made by fire research in the past, but it has always been difficult to maintain a desirable balance between empirical studies and those of a more fundamental nature. The Conference emphasized the need for study of basic relationships if we are to meet the urgent demands for more exact information on fire behavior, fire weather, evaluation of damages, and other important subjects.

The Conference agreed that a better balance may be achieved in the future and faster progress on the most difficult problems will be made if the proposals essentially as suggested in "A Policy for a More Adequate Fire Research Program"1/ are adopted with some definite modifications. Under this policy as amended, a limited number of task force groups of competent fire researchers to work as teams would be set up in sections of the U. S. They would have responsibility for basic work in a program developed jointly by Regions and Stations and closely coordinated nationally. The number of specialized teams justified and their assigned areas will be determined as the program is implemented. In addition, individual workers or groups attached to each regional station will supplement the work of the task forces by studying local problems and adapting the results of fundamental task force work to regional conditions.

It was recognized that an adequate program of fire research under this policy will require substantial additional financing. In the meantime, it was agreed that this general policy be implemented as fast as funds permit.

2. Better use of existing funds.

The Conference emphasized the importance of getting the utmost out of our limited research funds. We should concentrate on programs which have been selected jointly by Research and Administration. The present fire research groups should then avoid as far as possible unscheduled and service-type studies.

1/ This report is dated March 7, 1952, and was transmitted to station directors with Loveridge's letter of July 18, 1952, R-Research Program, General. Regional Foresters were sent an informational copy.

Another way to increase the returns from our current efforts is to pursue vigorously the policy of developing cooperation with all fire agencies and with non-Federal research institutions.

Summary of Recommendations.

It was unanimously agreed at both the Ogden and the RF&D conferences that a more adequate program of research is essential to the future progress in fire control, being sought by fire management. The recommendations adopted were each intended to promote that objective. In brief, they were as follows:

Recommendations.

1. That Administration and Research pool efforts to develop a better understanding by interested people of the importance of research to solution of most fire problems.

   W. O. Comment: Approved. Better coordination of effort in sponsoring fire research as an essential part of the fire control effort is much to be desired and the recommendation is heartily concurred in by this office. Most Directors find less incentive on the part of private individuals to sponsor research in fire because they look to public agencies to assume the major responsibility. At times, Regional Foresters hesitate to call attention to the need of new technical knowledge and "know how" to advance our fire control methods and practices. Yet the justifications for such work and the public interest in forest fires are at such a high level that coordinated effort to maintain Forest Service leadership in this field is timely and should be highly productive.

2. That better financing be assured.

   W. O. Comment: See comments under Financing.

3. That competent fire research teams be built up as funds become available at a few stations to push ahead on the more technical and highly complex problems.

   W. O. Comment: Approved. Concentration of effort at a few stations until a more adequate program can be built up, should assure faster progress.

4. That balance and coverage be assured by supplementing such task forces by individual workers or groups attached to each regional station by priority of need.

   W. O. Comment: Approved. This supplements the preceding.

5. That plans of work be developed for projects mutually agreed on by Research and Administration. Then both should avoid as far as possible any disruption of such plans by unscheduled or service-type studies, unless such demands are of an importance to justify mutual replanning of the program.

W. O. Comment: Approved. Needs attention by W. O. Divisions as well as by RF and D's.

6. That new emphasis be given to developing cooperative projects with joint financing with both NFA and cooperating fire and other agencies, particularly where the project is aimed at solution of local problems.

W. O. Comment: Approved. An evaluation of the cooperative research opportunities in sight was made in 1951 by Research. It showed they were unusually favorable in fire investigations. The lack of available staff in the Forest Service to plan such projects and to analyze results was the chief obstacle to enlarging the program by such means. Nevertheless, three major projects are now operating. Their effect is to triple the size of the program financed by the Forest Service. As the fire research staff can be built up, there should be excellent opportunities to further extend the program by such means in each region. Regional Foresters and Directors will need to collaborate in extending the program by such means.

7. That both Research and Administration give special attention to putting usable research results into the hands of field men and trainers without delay.

W. O. Comment: Approved. Research cannot be expected to do the whole job, and close collaboration in preparing and printing material for local use is needed. It is important that useful research information on fire be made available to all fire agencies. Research will need to see to it that publication of results is in appropriate form for this purpose. Both NF and Cooperative Forest Protection Divisions in Regional Offices will need to specify their needs and to participate in the planning, printing and distributing of such material. In addition, Research must assume responsibility for putting into permanent publication all fire research information of interregional value.

FINANCIAL ASPECTS OF FIRE MANAGEMENT

A number of conflicting and divergent forces are at work resulting in a very serious problem as to logical steps to take to obtain adequate fire protection of our natural resources. The integrity of the dollar has suffered in terms of its ability to buy supplies, materials and services. In contrast, the record of land use has shown an opposite trend. Economic and population pressure force us, as prudent men, to give attention to the future of fire control. We cannot wait for a return to the "good old days" of lower costs. Neither can we compromise in protection and accept lower standards because this would be the most expensive form of management we can devise.

A review of this subject is important to a full understanding of what has been happening to the strength of the fire organization and the fire research program and to a full appreciation of the problems confronting the Forest Service in the adequate protection of the resources. The following subtopics were discussed:

A. Resource Values Protected From Fire Damage.

There are 181 million acres of Federally owned land in 153 national forests. Principal resources of these lands requiring rigid fire protection measures are:

a. Water - A substantial part of the nation's water supply originates within the boundaries of the national forests, particularly in the eleven western states. In this area 53% of the total runoff comes from the national forests. In addition large amounts of water sink into the ground to help recharge underground water basins which furnish a substantial amount of the total water supply.

The national forests are a major source of water for 1800 towns and cities. Numerous other communities and thousands of residents of rural areas depend on national forest watersheds for their water supply.

Western national forests furnish much of the water for irrigation agriculture in western areas. More than 600 hydroelectric and thousands of industrial plants depend on national forest watersheds for their water supply.

There are over 1700 artificial reservoirs on the national forests.

Watersheds, to produce water that can be used readily and at least cost for domestic uses, hydroelectric power, and irrigation agriculture must have adequate fire protection.

b. Timber - The national forests support about 600 billion feet, board measure, of sawlogs and millions of cords of wood for pulp and in addition Christmas trees, naval stores and other forest products not directly expressable in board feet. In excess of 5 billion board feet of timber was harvested during 1953. Receipts from sale of timber in 1953 were 70.6 million dollars.

A total of 22,020 timber sales were made during the year which is a measure of the importance of national forest timber to the overall economy.

Mature timber is important to the current economy of the Nation. But of vastly more importance is the young timber that is growing in our forests since it is the basis for tomorrow's stand of sawlogs, pulp, naval stores and other forest products.

Fire has been a destroyer of timber both mature and immature over the centuries. Protection against fire is essential to the production of sawlogs and other forest products. (See Charts 1,2,3,5,and 7)

c. Forage.

(1) Domestic stock.

There are 138 million acres of national forest lands in the west. Of this area about 61 million acres is grazed by domestic stock. About 1.1 million cattle and 3 million sheep, owned by 20,000 permittees, graze the western national forests, usually during the summer months. Income from grazing fees totalled 4.4 million dollars during fiscal year 1953. In addition about 52,000 head of livestock, primarily milk cows and horses owned by local settlers were grazed without charge.

(2) Big game animals.

Approximately 3,000,000 deer, elk, antelope, moose, mountain goats and sheep graze the national forests. It is estimated that big game grazing in 1952 was the equivalent of 4.4 million animal months of grazing by domestic stock.

More than 9,000,000 visits were made to the forests for hunting and fishing during 1952 which is a measure of its value to the general economy since large sums are spent for shells, hunting licenses, tackle, gas, oil, food and other gear and material used by hunters and fishermen.

Fires can seriously impair the habitat for game and fish.

d. Recreation - 35 million visits to the national forests were reported in 1953 . This was a 10% increase over the previous year and 97% greater than in 1941. 42 percent of the visitors use the camp and picnic ground facilities. Fishing, hiking, skiing, hunting and riding were other popular recreational activities.

The scenic beauty of the forest - its lakes, streams and mountains - has an intrinsic worth not measurable in dollars and cents. Its protection from fire is important to the physical and spiritual health of the Nation.

B. Resources Are Increasing In Value.

The average selling value of national forest stumpage in the California region, for example, increased from $1.95 per thousand in 1940 to $17.15 per thousand in 1953. The land that produces the stumpage naturally becomes more valuable as the commodity harvested from it increases in value. Another factor to consider is the value of the land for producing usable water and the condition of the land from the angle of protection from floods. We should be able to increase protection from fire in proportion to the increased value of public and private property affected, in addition to protection of resource values on national forest land.

The western United States is growing rapidly. Populations increased 41 percent from 1940 to 1950 and in the past 20-year period the increase was 64 percent. Those who study these trends predict that the West's population will increase another 60 percent in the next 20 years. Many of our cities are now building right up to the toe of the mountains. Floods that often originate on burned watershed lands do more damage today because new homes, industrial plants, railroads, power lines, highways, bridges and many other facilities have been constructed in the path of potential floods. So, in addition to protecting the actual resource values on the national forests, we are confronted with the responsibility of protecting increasingly important downstream values from floods originating because of burned lands.

C. The Fire Job Is Becoming More Difficult.

The job of protecting national forest lands from fire is more difficult today than at any time in the past. Why?

a. Recreation increasing - More people use the national forests for recreation. During 1953 approximately 35 million visits were made to the national forests as compared to slightly over 16 million in 1940. It is estimated that 9 million of these 1953 visitors were hunters and fishermen who penetrated into remote areas of national forests to harvest fish and game. Because of this deep and scattered penetration, an extra risk was created over wide areas.

b. Industrial activity has been stepped up. In Fiscal Year 1954 around 5½ billion board feet of timber was cut on the national forests as compared to slightly more than 2 billion board feet in Fiscal Year 1941. Expansion to meet the full cut that can be made on national forests on a sustained yield basis will result in an annual harvest of approximately 6.9 billion board feet.

c. Increased timber cutting means more debris on the forest floor and this increases the fire hazard. It is estimated that timber cutting, insect kills, ecological changes, etc., is resulting in 1% of the land going into a higher hazard index bracket each year - 6,000,000 acres since 1938.

Typical debris resulting from logging
in spruce-fir type in the Intermountain area.

d. Ecological changes have taken place - fire has increased the area of brush fields particularly in the commercial forest lands of California and other areas in the far West. Cheat-grass - a much more explosive type of fuel - and similar highly inflammable vegetation has spread throughout portions of many national forests - Modoc, Plumas, Lassen, Boise are examples.

e. Widespread insect infestations of epidemic proportions kill large amounts of timber thereby increasing the fire suppression job.

Typical fire line construction through bug-killed lodgepole pine. Note pileup of debris.

D. The Depreciated Dollar and Its Impact.

(a) Based on cost of living index.

A study of the Cost of Living Index shows a drastic decline in the dollar value from 1850 to 1950. Today's dollar buys much less than it did ten years ago. The 1940 dollar was worth less than its counterpart before World War I, and even the 1910 dollar had depreciated badly as compared with ten, twenty, or even fifty years before. Any program started in 1940, for example, would have to be doubled today just to restore it to the position we thought we had when we started it ten years ago. Chart 26, compiled from information provided by the Federal Reserve Bank of New York graphically depicts the declining purchasing power of the dollar since 1850 based on the Cost of Living Index.

(b) Based on increased costs of operation.

The following summary of increased costs of operation resulting from the reclassification of short-term positions an average of one step in grade from 1941 to 1953, necessary pay increases granted by Congress, the Overtime Act of 1945, and increased costs of operation for such items as rentals, equipment purchases, tools, travel, etc., illustrates conclusively the impact on the strength of the fire organization:

Item	Index Comparison	
	1941	1953
Regional Office Personnel	100	152.5
Yearlong Forest Personnel	100	184.3
Short-term personnel required to work 6 days per week (60% of the short-term force)	100	264.0
Short-term personnel scheduled for 5 days per week (40% of)	100	202.6
Travel	100	191.5
Equipment and other costs	100	191.5

How does this affect one of our primary jobs -- that of maintaining a man on a lookout?

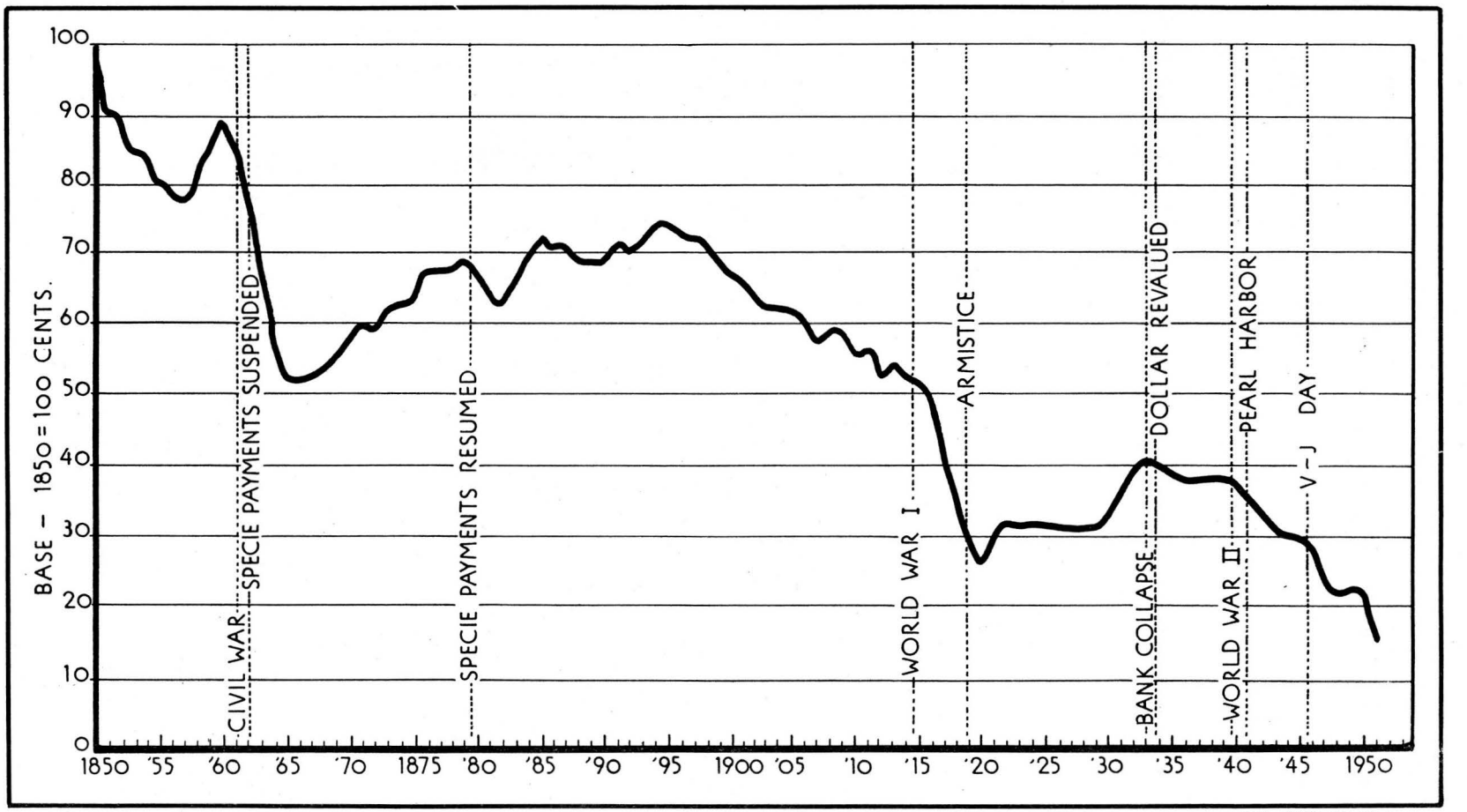


CHART 26

PURCHASING POWER OF THE DOLLAR SINCE 1850.

BASED ON COST OF LIVING DATA COMPILED BY FEDERAL RESERVE BANK OF NEW YORK.

Prior to World War II a typical fire lookout, fireman, or suppression crew member could be employed for $120 per month and could be required to remain on duty 7 days per week if fire conditions warranted. In 1951 it cost $265 per month for each of these typical positions - $204 per month for 40 hours per week with an additional $61 needed during the month to man the fire station the sixth day or 48 hours per week. Chart 27, which follows, shows this information graphically.

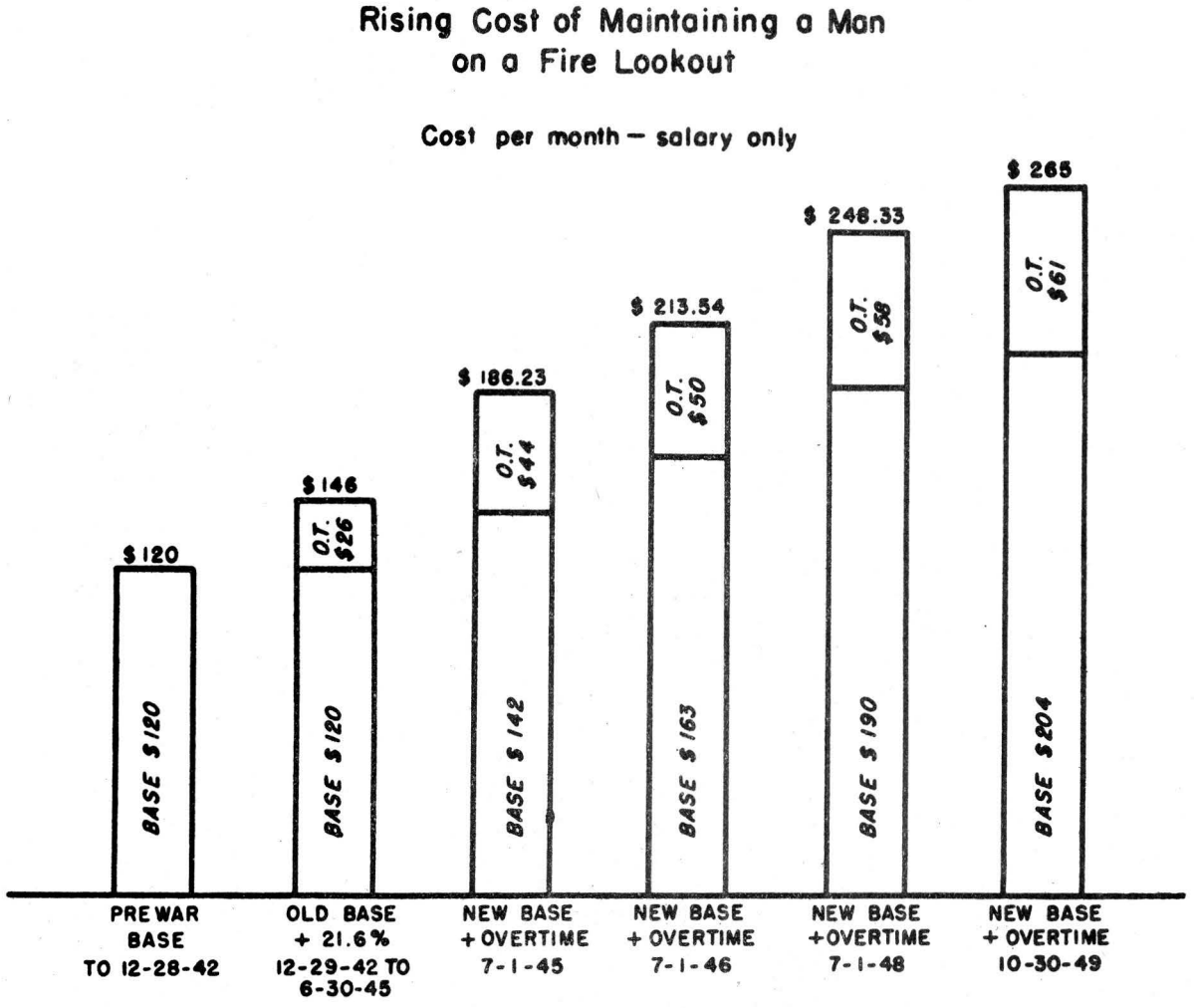


CHART 27

Fire fighting costs are higher -- the percentage of increase is considerably greater than the percentage above indicated for maintaining the basic presuppression forces. In 1940 it cost approximately $53.00 per hour to employ an average fire crew while today it costs $187.00. According to this analysis suppression costs have increased 3½ times since 1940 for the same type and strength of crew.

The least costly fires are those which are kept small which requires that they be hit hard with an adequate initial attack force. Maintenance of an adequate initial attack force depends upon financing a strong basic presuppression organization. Excessive suppression costs often result from errors in the initial action phases. This can be traced back to stretching the presuppression forces so thin that they are ineffective.

Chart 28 provides a graphic picture on the increased costs of suppression.

Dollar depreciation has cut deeply into funds appropriated for fire research. The 1953 dollar buys approximately half of what it did in research services in 1945. At the same time, values to be protected have risen many times and this, along with the depreciated dollar, renders the current fire research dollar even less than half as effective. The $133,000 worth of fire research funds allotted for the present fiscal year actually will have a purchasing power of around $65,000 in 1945. In view of rising resource values and expenditures for fire control, an increase in fire research funds is essential.

E. Improving Financial Management.

Much can and is being done to improve financial management. It is essential to squeeze every ounce of fire control out of the depreciated dollar. Research has guided us in providing knowledge on fighting fires. It has been our objective to currently improve our methods to get the most fire protection possible for the dollars available.

We can and must go further. Some of the management tools which we are using and which can, in some instances, be used to a greater extent are:

a. A new look and a new approach toward fire prevention. A fire prevented costs nothing for suppression and does no damage.

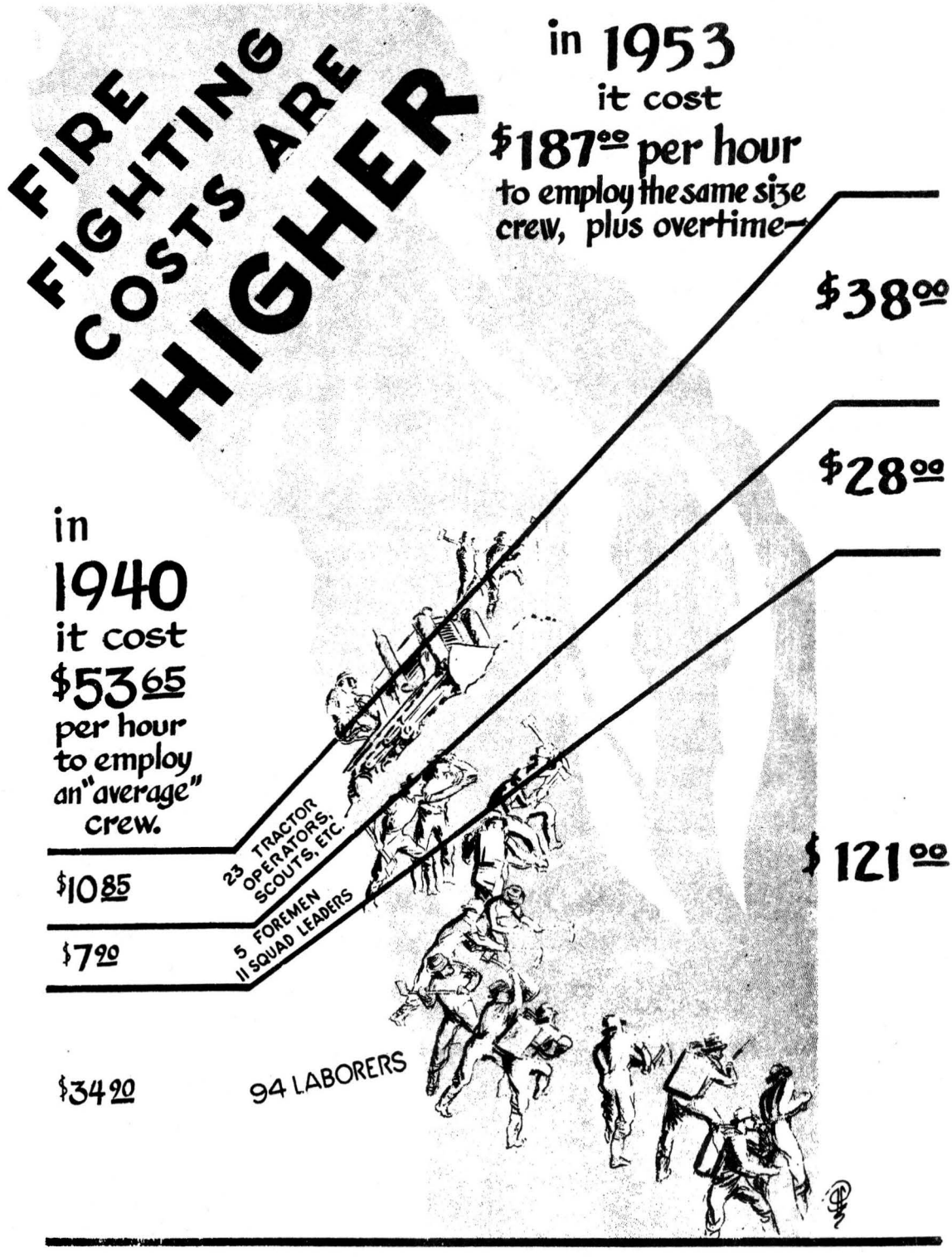

FIRE FIGHTING COSTS ARE HIGHER
in 1953 it cost $187.00 per hour to employ the same size crew, plus overtime—
$38.00
$28.00
in 1940 it cost $53.65 per hour to employ an "average" crew.
$121.00
23 TRACTOR OPERATORS, SCOUTS, ETC.
$10.85
5 FOREMEN 11 SQUAD LEADERS
$7.20
$34.20
94 LABORERS

CHART 28

b. Development of better fire danger rating systems so that we can make further improvements in building suppression forces adequate to cope with existing fire danger.

c. Increased emphasis on the already commendable training program in fire control.

d. Provide well trained safety officers -- accidents should be prevented before they occur.

e. Especially on large fires, provide business managers who will advise with suppression officers on the most economical way to accomplish the work at hand.

f. Use the "Board of Directors" approach to advise the fire manager.

g. Improve on training and correlating work project groups such as timber, timber stand improvement, road and other crews to meet the needs of fire control. This is conducive to more versatile financial management.

h. Expand use of awards for good work in fire control.

i. Use a realistic approach in damage reporting and take into consideration all resource damages, such as watershed, soil, plants, recreation and wildlife, as well as timber. Aesthetic values and downstream private and public values exposed to flood hazard should also be evaluated.

j. Continue to keep those responsible for fire control currently informed on the findings of fire research.

k. Continue to consider protection from fire an inseparable part of overall resource management and integrate it accordingly.

l. Improve inspection standards and provide for adequate follow-up.

m. Press to get the most effective fire control out of the funds provided.

n. Provide for a study every 5-10 years to determine how fire fighting resources shall be divided among the fire problems as they exist at the time. This is necessary to meet new problems that develop in the interim.

o. Continue to develop and make effective use of equipment in fighting fire. Equipment such as tractors, pumpers, power saws, and plows have provided substantial savings in many situations. This phase of progress in fighting fire must continue to be explored and expanded wherever it can be efficiently used.

We have been losing ground in our efforts to protect the national forests from fire since about 1949. This has happened in spite of the fact that we have had improved techniques, better planning, and have given increased attention to the job. Some of the reasons have already been stated, and illustrated. The charts shown under the first topic illustrate that damages from fire are excessive.

Fire Control, today, is skating on very thin ice - the thinness of the ice depending on a year of easy fire weather for success on holding resource loss to a tolerable level. It is not, today, capable of meeting the fire situation confronting it during periods of severe or critical fire weather. The fire control dollar is today stretched too thinly.

F. Does Increased Efficiency and Strength of The Fire Organization Pay Dividends?

Graph 29 depicts the area of land within national forest boundaries which was burned over annually by 5 year period since 1919. This graph shows that as the fire organization increased in strength and efficiency less and less area was burned over from fire. The alarming feature of this graph is the increase in annual area burned over during the period 1949-53. This is the first time since 1919, that the graph shows a sharp increase in area burned over.

The fire organization is at its lowest strength in 21 years due to the depreciated value of the dollar. This, no doubt, is one of the primary reasons for an annual increase in burned area during the past 5 years contrasted to the period immediately preceding. The other reason for an increase in burned area is the critical weather conditionsprevailing over large areas during parts of the latter period.

G. Increased Financial Needs for Reasonably Adequate Protection and an Adequate Research Program.

All regions and research stations were requested to make a careful analysis of their additional "rock bottom" needs for fire control purposes, on the basis of present conditions. Their estimates follow:

AREA BURNED INSIDE NATIONAL FOREST BOUNDARIES (EXCLUSIVE OF ALASKA)
PERCENT BURNED OF PROTECTED AREA INSIDE
(BY FIVE YR. AVE.)

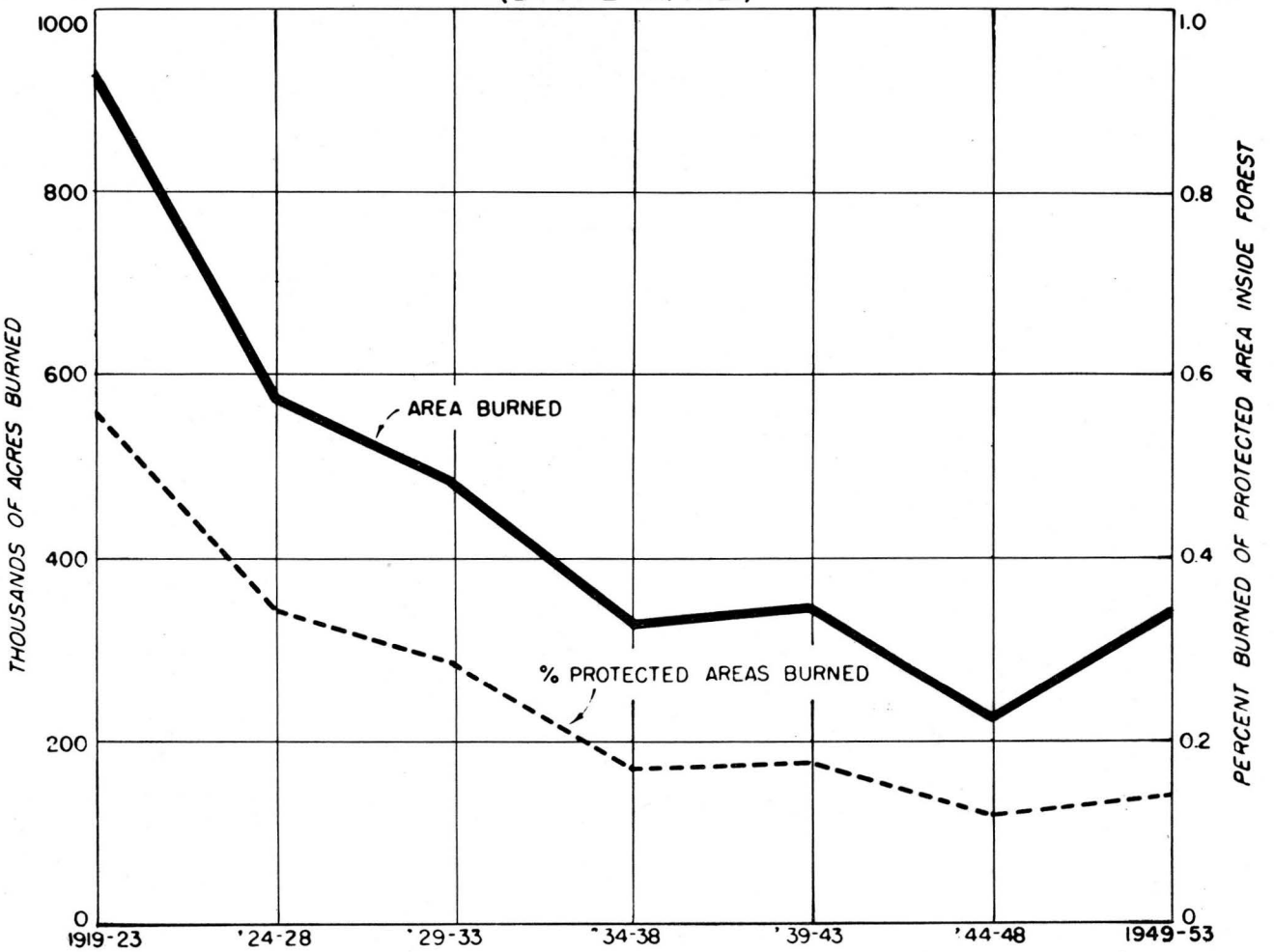


Chart 29

Administration

Recurring Expenses	Man-Months	Amount
Fire Control Staff Officers	564	$ 192,994
Detection Personnel (L.O.'s)	1,229	290,342
Short-Term Protection Personnel	11,173	2,706,623
Yearlong Protection Personnel	302	91,917
Auxiliary Personnel	346	97,449
Training		57,382
Travel		366,427
Supplies and Materials		80,500
Contractual Services		27,424
Miscellaneous Services		55,383
Mtce. Government-Owned Airplanes		20,000
Fire Break Annual Maintenance		35,150
Other		38,100
Total Recurring Expenses	13,614	($4,059,692)

The foregoing is exclusive of base increases for the necessary "common service" functions coincident to Fire Control activities. Hence the amount of increase that should be appropriated for reoccurring expenses is not $4,059,692, but this amount divided by 81% or $5,011,000. This corresponds very closely to the amount of additional funds needed as determined from the coordinated fire replanning work done in the 1940's if the dollar value is made to correspond with the 1954 index -

$5,011,000

Development Expenses

Equipment Purchases:	
Line Construction	46,480
Water	60,700
Transportation	100,250
Communication	217,400
Other	6,200
Housing Personnel	654,000
Bldgs. and Structures, Other (Includes Lookouts)	251,500
Fire Breaks (Construction)	77,680
Water Developments	20,570
Landing Fields and Strips	131,400
Other:	
Fire Caches	20,800
Snag Felling	750,000
Total Development Expenses	$2,336,980
Grand Total Recurring & Development Expenses..	7,347,980
F.Y. 1954 Fire Control Appropriations	8,247,000
Total Needed Administration only	$15,594,980

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Grand Total Recurring & Development Expenses..	

Research	Amount
Financial Needs For Fire Research	$700,000
Current Appropriations (FY 1955)	183,000
Additional Needed For Research	$517,000

H. Recommendations.

It was the unanimous judgment of the conferees that the amount of additional funds recommended for fire control and fire research purposes is a good and wise investment.

It will cost the American people approximately 10½ million dollars to suppress fires on the national forests during fiscal year 1954. Damages including damage to watersheds which resulted from fires in calendar year 1953 were almost twice the 14 million dollars reported in 1951. Presuppression costs of approximately $8,300,000 when added to the suppression bill of 10½ million dollars and $22,000,000 in damages make the fire bill in 1953 total over $40,000,000 for national forest areas. Damages undoubtedly would have run into hundreds of millions of dollars without protection. With adequate protection bolstered and made more efficient by an adequate research program suppression costs and damages would be greatly reduced. In addition to the high suppression costs and the damages of destructive fires, scores of people have been injured or burned to death as a direct result of forest fire fighting (17 during 1953). A much greater effort must be made to prevent these destructive fires which account for human tragedies and disastrous losses in resources.

W. O. Comment - There is much more that can be done to improve efficiency in Fire Management without additional funds. The men attending the meeting agreed that improved efficiency was not solely a question of additional funds. Analyses, conclusions and recommendations contained in this report are filled with suggestions on ways to improve fire control work without additional funds. Pages 118 - 121 , in particular, point out new ways to improve Fire Management and make it more efficient.

We recognize there is real room for improvement in our fire control work and without additional funds. We recognize, also, that if every improvement suggested during the Conference were attained the fire organization would remain incapable of providing fully the degree of protection from fire required by resource managers.

We concur with the recommendation on the need for additional financing to meet more fully our responsibilities in the protection of national forest resources from fire.

It was recommended that $1,000,000 be transferred from the Suppression Appropriation of $6,000,000 to the Prevention and Preparedness Appropriation of approximately $8,250,000.

W. O. Comment - This proposal has a lot of appeal. There is no question that a sizeable portion of the FF expenditures in recent years would have bought far more protection if it could have been used to strengthen presuppression action. But any guarantee that an increase of $1,000,000 in P&M 101 funds would correspondingly reduce the FF expenditures found necessary in a preceding year would be fraught with the inherent uncertainties of weather and chance, even on a Service-wide basis. The proposal will, however, be given further study in the near future.

ATTENDANCE

Technical Meeting
Ogden, Utah
February 15-20,1954

R. W. Bailey - INT.
J. S. Barrows - INT.
A. A. Brown - W.O.
C. C. Buck - CAL.
A. R. Cochran - R-7
C. K. Collins - R-3
M. A. Coonrod - R-4
R. W. Cowlin - PNW
I. C. Funk - W.O.
C. A. Gustafson - W.O.
A. W. Hartman - R-8
G. M. Jemison - CAL.
K. W. Linstedt - R-6
C. K. Lyman - R-6
J. W. Mattisson - R-6
R. B. McKennan - R-2
J. A. Mitchell - LS
W. G. Morris - PNW
M. M. Nelson - R-5
R. M. Nelson - SE
C. J. Olsen - R-4
B. L. Rasmussen - W.O.
A. E. Spaulding - R-1
J. L. Sevy - R-4
A. W. Sump - W.O.
L. R. Thomas - R-5
J. M. Walley - R-9
R. L. Williams - R-2
F. W. Godden - W.O.

Policy-Action Meeting
Washington, D. C.
April 8-9, 1954

R. E. McArdle, Chief
E. C. Crafts - Asst. Chief
E. P. Cliff - " "
V. L. Harper - " "
H. Hopkins - " "
E.W. Loveridge - " "
P. D. Hanson - RF - R-1
D.E.Clark - " R-2
C.O. Lindh - " R-3
C.J. Olsen - " R-4
C. W. Hendee - " R-5
J.H. Stone - " R-6
C.L. Tebbe - " R-7
C.A.Connaughton " R-8
H. D. Cochran - " R-9
A.W. Greeley - " R-10
J. A. Hall - Director - FPL
R. W. Bailey " INT.
G.M. Jemison " CAL.
R.W. Cowlin " PNW
E.L. Demmon - Director - SE
R. Price - " R. Mtn.
W. G. McGinnies " CS
M. B. Dickerman " LS
R. W. Marquis " NE
P. A. Briegleb " S

C. A.Gustafson - W.O.
A. A. Brown - "
I. C. Funk - "
B. L. Rasmussen - "
M. M. Nelson - R-5
A. E. Spaulding - R-1
R. M. Nelson - SE
A. W. Hartman - R-8
R. B. McKennan - R-2
A. R. Cochran - R-7
K. W. Linstedt - R-6
and Washington Office Division Chiefs and others part time.

THE AGENDA AND ASSIGNMENTS

Preparatory work for the conference was assigned to task force groups with the chairman being either a Regional Forester or Director. Each member of the task force was responsible for preparation of material coming within the scope of his topic assignment. Following is the combined agenda, with assignments, for the Ogden and Washington conferences:

FIRE CONTROL CONFERENCE

SPECIALIST SECTION - (2/15/20) Ogden - General Chairman NFA Session-Gustafson
" " Research " -Brown
R&D SECTION (4/8-4/9) Washington - " " NFA " -Cliff
" " Research " -Harper

STOCK TAKING IN FIRE CONTROL MANAGEMENT

Task Force Chairman - Preparatory Stage - Hendee (R-5).
" - Specialist Session, Ogden - Nelson (R-5).
" " " - R&D Session, Washington - Hendee (R-5).
Presentation - " " " - Nelson (R-5).

Protection results.

1. Resource losses and their overall significance.

Presentation - Nelson (R-5) - Ogden.

2. Adequacy of fire protection as determined from a study of sample management units.

Presentation - Barrows (INT) - Ogden.

Trends in protection strength.

1. Presuppression forces.

Presentation - Collins (R-3) - Ogden.

2. Mechanization of fire fighting.

Presentation - Hartman (R-8) - Ogden.

3. Roads, trails, airfields and improvements.

Presentation - Nelson (R-5) - Ogden.

Effectiveness of suppression action.

1. The initial action phase.

Presentation - Lyman (R-1) - Ogden.

2. The project fire phase.

Presentation - Collins (R-3) - Ogden.

3. Average size of MC and Lightning fires, number or percent of Class A and B and Class C, D and E fires, number or percent of extra period fires.

Presentation - Buck (CAL) - Ogden.

RELATION OF FIRE MANAGEMENT TO OTHER RESOURCE MANAGEMENT WORK.

Task Force Chairman - Preparatory stage - Stone (R-6).
" - Specialist Session, Ogden - Linstedt (R-6).
" " " - R&D Session, Washington - Stone (R-6).
Presentation - " " " - Linstedt (R-6).

Integration and correlation of fire control with other resource management work.

1. Silvicultural relationships.

Presentation - Thomas (R-5) - Ogden.

2. Treatment of fuels.

Presentation - Linstedt (R-6) - Ogden.
Morris (PNW)

3. Water management.

Presentation - Bailey (INT) - Ogden.

4. Inaccessible areas - wilderness, wild and primitive areas.

Presentation - Spaulding (R-1) - Ogden.

Standards of protection by management units.

FOREST FIRE PREVENTION.

Task Force Chairman - Preparatory Stage - Hanson (R-1).
" - Specialist Session, Ogden - Spaulding (R-1).
" " " - R&D Session, Washington - Hanson (R-1).
Presentation - " " " - Spaulding (R-1).

Statistical - Number of man-caused fires by major causes per million acres by regions and all national forests for a later period (1948-51) and an earlier period (1935-38).

Presentation - Hartman (R-8) - Ogden.

Is fire prevention being given the vigorous and effective attention it deserves?

Presentation - Collins (R-3) - Ogden.

Education efforts.

Presentation - Thomas (R-5) - Ogden.

PERSONNEL ASPECTS OF FIRE MANAGEMENT.

Task Force Chairman - Preparatory stage - Clark (R-2).
" - Specialist Session, Ogden - McKennan (R-2).
" " " - R&D Session - Washington - Clark (R-2).
Presentation - " " " - McKennan (R-2).

Fire training.

Presentation - Walley (R-9) - Ogden.

Inspection.

Presentation - Rasmussen (W.O.) - Ogden.

Careers in fire management.

Presentation - McKennan (R-2) - Ogden.

INTERREGIONAL USE OF ORGANIZED FIRE FIGHTERS AND OVERHEAD.

Presentation and discussion Chairman, Specialist Session, Ogden - Williams (R-2)

(No discussion Washington).

STOCK TAKING IN THE TECHNICAL ASPECTS OF FIRE CONTROL.

Task Force Chairman - Preparatory Stage - Jemison (CAL).
" " " - Specialist Session " " - Ogden.
" " " - R&D " " " "
Presentation - " " " " Washington

How do we stand in respect to men and facilities in fire research?

Presentation - Buck (CAL) - Ogden.

Proposed Policy of Concentrating more fundamental aspects of fire research. What supplemental provisions will be needed to give coverage?

Presentation - Jemison (CAL) - Ogden.

High Spot review of how we stand in our technical knowledge and its application on the job.

Presentation - Barrows (INT) and Buck (CAL).

What are the priorities in fire management and what can be done to bring fire research into better balance with the action program?

Presentation - Jemison (CAL) - Ogden.

FIRE FINANCING - ADMINISTRATION AND RESEARCH.

Task Force Chairman - Specialist Session, Ogden - For NFA - Olsen (R-4. Research -Cowlin (PNW).
" - RF&D Session, Washington - Olsen (R-4).
Presentation - " " " " (R-4).

Resource values protected from fire danger.

Resources increasing in value.

The fire job is becoming more difficult.

The Depreciated dollar and its impact.

Presentation - Collins (R-3) - Ogden.

Improving financial management.

Presentation - Nelson (R-5) - Ogden.

Does increased efficiency and strength of the fire organization pay dividends?

Increased financial needs for reasonably adequate protection and an adequate research program.

Presentation - Spaulding (R-1) - Ogden.